



City of Bothell™

# **BOTHELL DESIGN AND CONSTRUCTION STANDARDS**

## **2019 UPDATE**

**Public Works Department  
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Bothell, WA 98011  
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# Chapter 1

## GENERAL CONDITIONS



City of Bothell™

## DESIGN AND CONSTRUCTION

## STANDARDS AND SPECIFICATIONS

2019

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# 1-1 STANDARDS

The Bothell Design and Construction Standards and Specifications, referred to as the Bothell Standards, apply whenever public or private work is performed within the City limits, including work performed by private parties at their own expense under authority associated with a City Permit or granted by ordinances of the City Council. Capital improvement projects are required to meet all standards outlined in this document unless the Public Works Director approves an exception from the design standards in effect at the time of construction. Except where these Bothell Standards provide otherwise, design, construction and materials must conform to the appropriate standards of the most current edition of the following publications produced jointly by the Washington State Department of Transportation (WSDOT) and the Washington State Chapter of the American Public Works Association (APWA).

1. WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, referred to in this document as the WSDOT Standard Specifications.
2. WSDOT Standard Plans.

Periodically, the City may modify the Bothell Standards in order to make corrections, clarify procedures, and revise the standards or specifications to conform to municipal practice, changes in policy, updates to methods of design and construction, new technology, or corrections to typographical errors.

## 1-2 REFERENCES

These Standards were developed using the currently adopted provisions of the following publications:

1. Bothell Municipal Code (BMC)
2. Bothell Comprehensive Plan: Imagine Bothell
3. King County Stormwater Pollution Control Manual
4. Bothell Cross Connection Control Program Manual
5. American Water Works Association (AWWA) Standards
6. International Building Code (IBC)
7. National Electrical Code (NEC)
8. Uniform Plumbing Code (UPC)
9. International Mechanical Code (IMC)
10. United States Department of Transportation (USDOT) Standards
11. Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD)
12. American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets
13. AASHTO Guide for the Development of Bicycle Facilities
14. AASHTO LRFD Bridge Design Specifications and Seismic Bridge Design
15. Transportation Research Board (TRB) Highway Capacity Manual
16. Institute of Traffic Engineers (ITE) Trip Generation and Design Manual
17. Illuminating Engineering Society (IES) Design Manual
18. Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities
19. Uniform Federal Accessibility Standards
20. Ecology Criteria for Sewage Works Design ("Orange Book")
21. Washington State Department of Health Water System Design Manual
22. Washington State Department of Transportation (WSDOT) Bridge, Design, Construction, Traffic, and Utilities Manuals



## 1-3 DEFINITIONS

For the purpose of these Standards, the terms, phrases, words, and their derivations have the following definitions. When not inconsistent with the context, words used in the present tense include the future tense and words in the plural form include the singular form. The word “must” is mandatory. The word “may” is permissive. Definitions from the BMC also apply to these Bothell Standards. The Public Works Director has the authority to interpret definitions.

### **Appurtenances**

Machinery, appliances, or auxiliary structures attached to main structure, but not considered integral for purpose of enabling it to function.

### **APWA (“American Public Works Association”)**

Professional association of public works agencies, private companies, and individuals dedicated to professional excellence and public awareness through education and advocacy.

### **Arterial**

Road or street primarily for through traffic, such as roads or streets that are considered collectors. This does not include local access roads limited to access for neighboring properties.

### **As-built drawings (“As-builts”)**

Engineering plans that have been revised to reflect changes to plans that occurred during construction.

### **Auxiliary Supply**

Water source or system, other than the City’s water system, that may be available in a building or premises.

### **Backflow**

Flow in direction other than its intended direction, of water, gas, or substances into the distribution system of a public utility system. Back pressure means backflow caused by pump, elevated tank, boiler, or other means that could create pressure within system greater than City’s supply system pressure. Back siphonage is form of backflow due to negative or sub-atmospheric pressure within a utility system.

### **Backflow prevention assembly**

Assembly approved by Washington State to protect against cross-connection.

### **BMP (“Best management practice”)**

Schedule of activities, prohibition of practices, procedure, or structural or managerial practice approved by the City, Ecology, or another governing body, that prevents or reduces the release of pollutants and other adverse impacts to the environment.

### **Bioswale**

Long, gently sloped, vegetated ditch designed to remove pollutants from stormwater.

### **Bioretention**

Stormwater best management practice consisting of shallow landscaped depression designed to temporarily store and promote infiltration of stormwater runoff. Standards for bio-retention design are specified in Bothell Surface Water Design Manual.

### **Bollard**

Post used to prevent vehicular access. A bollard may or may not be removable.

## **Bothell Surface Water Design Manual**

Guiding Document to Bothell Standards containing technical and administrative procedures established by the Public Works Director that describe methods to be used, level of analysis required, and other details for implementation of the provisions of surface water design.

### **Buffer zone**

Area contiguous to a critical area required for the continued maintenance, functioning, or structural stability of a critical area.

### **BSBL (“Building setback line”)**

Line measured parallel to property, easement, drainage facility, or buffer boundary that delineates the area (defined by the distance of separation) where buildings or other obstructions are prohibited. Wooden or chain link fences and landscaping are allowable within a building setback line.

### **Certified Erosion and Sediment Control Lead (CESCL)**

Individual with erosion and sediment control training that meets minimum standards established by Ecology. A CESCL is knowledgeable in practices of erosion and sediment control and must have the skills to assess site conditions and construction activities that could impact the quality of stormwater and the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges. Certification is obtained through an Ecology approved erosion and sediment control course.

### **Civil engineer**

Person licensed by the State of Washington as a professional engineer in civil engineering.

### **Clearing**

Conversion of native vegetated surface to a non-native surface.

### **Commercial project (or land use)**

Project or land use requiring commercial building permit, or site where permit would be required for construction of a building, including industrial projects or land uses and mixed-use, commercial, or multifamily projects or land uses. Agricultural projects included only if they require commercial building permit. Single-family residential projects not included.

### **Community Development Director**

Community Development Director or their designee.

### **Conveyance system**

Drainage facilities and features, both natural and constructed, that provide for collection and transport of surface water or stormwater runoff. Natural elements of conveyance system include swales and small drainage courses, streams, rivers, lakes and wetlands. Constructed elements of conveyance system include gutters, ditches, pipes, catch basins, channels and most flow control and water quality facilities.

### **Critical area**

Any of the following areas or ecosystems: aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, streams, and wetlands, as defined in BMC 14.04.

### **Critical area report**

Report evaluating probable impacts of development proposal on critical areas regulated under BMC 14.04.

**Culvert**

Pipe or concrete box structure that drains open channel, swale, or ditch under roadway or embankment, typically with no catch basins or manholes along its length.

**Cut slope**

Slope formed by excavating overlying material to connect the original ground surface with a lower ground surface created by the excavation.

**Dedication of land**

Assigning ownership for a portion of a property for a specific use or function.

**Design engineer**

Civil engineer who prepares analysis, design, and plans for Developer permit or approval submittal.

**Detention**

Release of surface and stormwater runoff from site at slower rate than collected by drainage facility system, with the difference being held in temporary storage.

**Detention facility**

Facility that collects water from developed areas and releases it at slower rate than it enters. Excess of inflow over outflow is temporarily stored in pond or vault and is typically released over hours or days.

**Developer**

Property owner, public agency, public or private utility, person, contractor, or entity named in writing by property owner on an application for a development, permit, or approval to act as applicant, that owns right-of-way or other easement, or adjudicated rights to such easement under RCW 8.12.090.

**Development**

Activity upon land consisting of construction or alteration of structures, earth movement, dredging, dumping, grading, filling, mining, removal of sand, gravel, or minerals, driving of piles, drilling operations, bulk heading, clearing of vegetation, activities associated with construction of structures or infrastructure, or other land disturbance or development activities. Includes storage or use of equipment or materials inconsistent with existing use. Also includes approvals issued by City binding land to specific patterns of use, including but not limited to subdivisions, zone changes, conditional use permits, and binding site plans.

**Development Review Engineer**

Responsible for conditioning, review, inspection, and approval of right-of-way use permits and road and drainage improvements constructed as part of development permits administered by the City.

**Development Services**

Interdisciplinary project and permit review team consisting of staff from the Community Development, Fire, and Public Works Departments.

**Ditch**

Constructed channel with top width less than ten feet at design flow.

**Drainage facility**

Constructed or engineered feature that collects, conveys, stores, treats, or otherwise manages stormwater runoff or surface water. Includes, but is not limited to, constructed or engineered stream, lake, wetland, or closed depression, or a pipe, channel, ditch, gutter, flow control facility, flow control BMP, water quality facility, erosion and sediment control facility, and any other structure and appurtenance that provides for drainage.

**Easement**

Legal right to use parcel of land for particular purpose. Does not include fee ownership, but may restrict owner's use of the land.

**Ecology**

The Washington State Department of Ecology.

**Embankment**

Structure of earth, gravel, or other material raised to form pond bank or foundation for road.

**Energy dissipater**

Means by which total energy of flowing water is reduced. Usually mechanism that reduces velocity prior to or at discharge from an outfall in order to prevent erosion. Include rock splash pads, drop manholes, concrete stilling basins or baffles, and check dams.

**Erosion**

Process whereby wind, rain, water, and other natural agents mobilize and transport particles, as defined in BMC 14.04

**Erosion Hazard Area**

Areas as defined in BMC 14.04 or as identified by Department of Agriculture National Resources Conservation Service as having "moderate to severe," "severe" or "very severe" rill and inter-rill erosion hazard or those areas containing soils which, according to the USDA Soil Conservation Service Soil Classification System, may experience severe to very severe erosion hazard.

**Existing conditions**

Conditions of access, utilities, development, vegetation, and impervious cover at time of analysis.

**Fill Slope**

Slope formed by placing and compacting material to create a slope and surface that is higher than the original ground surface.

**Fire Marshall**

Fire Marshall or their designee.

**Franchise Area**

Area defined within individual franchise agreement entered into by City and another party for specified purpose, generally including street rights-of-way.

**Geotechnical engineer**

Civil engineer, licensed by the Washington State, with at least four years of professional employment as a geotechnical engineer specializing in the design and construction aspects of earth materials.

**Grading**

Shaping, excavating, or filling of ground surface.

**Groundwater**

Water in a saturated zone or stratum beneath the surface of land or a surface water body, as defined in BMC 14.04.

**Illicit discharge**

Non-stormwater discharge to stormwater drainage system causing or contributing to violation of state water quality, sediment quality, or ground water quality standards, including but not limited to sanitary sewer connections, industrial process water, interior floor drains, car washing, and gray water systems.

**Improvement**

Permanent, man-made, physical change to land or real property including, but not limited to, buildings, streets, driveways, sidewalks, crosswalks, parking lots, water mains, sanitary and storm sewers, drainage facilities, and landscaping.

**Infrastructure**

Basic public installations such as roads, transportation systems, parks, and utilities.

**Land disturbing activity**

Activity that results in a change in existing soil cover (vegetative, non-vegetative, or existing soil topography) to include demolition, construction, clearing, grading, filling, excavation, and compaction. Does not include tilling conducted as part of agricultural practices, landscape maintenance, or gardening.

**Land surveyor**

Person licensed by the State of Washington as a professional land surveyor.

**Low Impact Development (LID)**

Stormwater and land use management strategies that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices integrated into project design.

**LID Principles**

Land use management strategies that emphasize conservation, use of on-site natural features, and site planning to minimize impervious surfaces, native vegetation loss, and stormwater runoff.

**Maintenance**

Usual activities taken to prevent decline, lapse, or cessation in use of currently serviceable structures, facilities, BMPs, equipment, or systems if there is no expansion of any of these, and there are no significant construction impacts. Maintenance includes repair or replacement of non-functional facilities and BMPs, and the replacement of existing structures with different types of structures, if the repair or replacement is required to meet current engineering standards or is required by one or more environmental permits and functioning characteristics of original facility or structure are not changed.

**Multifamily project or land use**

Project or land use requiring commercial building permit or commercial site development permit for development of residential dwelling units, not detached single family or duplex dwelling units.

**National Pollutant Discharge Elimination System (NPDES)**

Part of Clean Water Act which requiring point source discharges to obtain permits administered by Ecology, and referred to as NPDES Phase II Permit.

**Outfall**

Point where collected and concentrated surface and stormwater runoff is discharged from a pipe system or culvert.

**Owner**

Each legal owner of property to which sewer service is provided or will be benefitted by an extension or alteration of municipal utility systems.

**Permeable pavement**

Pervious concrete, porous asphalt, permeable pavers or other forms of pervious or porous paving material intended to allow passage of water through pavement section. Often includes aggregate base providing structural support and acting as stormwater reservoir.

**Pervious surface**

Surface material that allows stormwater to infiltrate into ground. Examples include lawn, landscape, pasture, and native vegetation areas. Note for purposes of threshold determination and runoff volume modeling for detention and treatment, vegetated roofs and permeable pavements are to be considered impervious surfaces along with lawns, landscaping, sports fields, golf courses, and other areas that have modified runoff characteristics resulting from the addition of underdrains.

**Pipe system**

A network of storm drain pipes, catch basins, manholes, inlets, and outfalls designed and constructed to convey surface water.

**Plat**

Map or representation of subdivision showing division of tract or parcel of land into lots, blocks, streets, or other divisions and dedications, as defined in BMC 15.

**Preapplication**

Form and/or meeting used by Developer for development permit to present initial project intentions to Development Services. Preapplication is not the same as application.

**Project**

Proposed action to alter, develop, or redevelop a site that may also permitting and engineering review.

**Project site**

Portion of site and offsite areas subject to proposed project activities, alterations, and improvements. This definition supersedes BMC 14.04.

**PSE**

Puget Sound Energy.

**Public Works Director**

Public Works Director or their designee.

**Receiving bodies of water**

Creeks, streams, rivers, lakes, and other bodies of water into which surface waters are directed, either naturally or in manmade ditches or piped systems.

**Residential Access Street**

Neighborhood or local access street.

**Riprap**

Facing layer or protective mound of stones placed to prevent erosion or sloughing of a structure, construction entrance, or embankment due to the flow of surface and stormwater runoff.

**Sediment**

Fragmented material which originates from weathering and erosion of rocks or unconsolidated deposits, and which is transported by, suspended in, or deposited by water.

**Short plat**

Map or representation of a short subdivision, as defined in BMC 15.

**Short subdivision**

Division of land into four or less lots, tracts, parcels, sites, or subdivisions for purpose of sale, lease, development, or financing, as defined in BMC 15.

**Sidewalk section**

Portion of driveway approach lying between back edge of the sidewalk and apron, including end slopes, measured at front edge of sidewalk.

**Sight triangle**

Unobstructed line of sight along both approaches of both roads at intersection, and across included corners for distance sufficient to allow the operators of both vehicles, approaching simultaneously, to see each other in time to prevent a collision.

**Significant trees**

Vegetation subject to tree retention as defined in BMC 12.18.030.

**Slope**

Gradient in a ratio of horizontal feet per vertical feet, or expressed as percentage. Side slopes ratios of drainage facilities are referred to with the horizontal dimension first.

**Snohomish PUD**

Snohomish County Public Utility District.

**Storm drain**

Enclosed conduits that transport surface and stormwater runoff toward points of discharge (sometimes called storm sewers).

**Storm drain system**

System of gutters, pipes, streams, or ditches used to carry surface and stormwater from surrounding lands to streams, lakes, or Puget Sound.

**Stormwater**

Water produced during precipitation or snowmelt, which runs off, soaks into ground, or dissipated through evapotranspiration.

**Stormwater runoff**

Stormwater that flows over or below the surface. Stormwater runoff contributes to and becomes surface water or groundwater.

**Surface water**

Water existing on land surfaces before, during, and after stormwater runoff such as water found on ground surfaces and in drainage facilities, rivers, streams, springs, seeps, ponds, lakes, wetlands, and Puget Sound. It also includes shallow groundwater.

**Bothell Surface Water Design Manual**

Manual describing surface and stormwater design and analysis requirements, procedures, and guidance.

**Swale**

Shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than 1-foot.

**Temporary Erosion and Sediment Control (TESC) Measures**

Erosion and sediment control measures implemented before final stabilization of site to reduce erosion, control siltation and sedimentation, and prevent discharge of sediment-laden water from site.

**Tract**

Legally created parcel of property designated for special non-residential and non-commercial uses.

**WSDOT**

Washington State Department of Transportation.



## 1-4 CONSTRUCTION NOISE

Pursuant to BMC 8.26, there must be no sound made by the construction, excavation, repair, demolition, destruction, or alternation of any building or property or upon any building site outside the following hours:

Monday through Friday..... 7 a.m. to 8 p.m.  
Saturday..... 9 a.m. to 6 p.m.  
Sunday ..... Work NOT allowed  
City-observed holidays ..... Work NOT allowed (See BMC 8.26)

### **City-observed holidays are:**

New Year's Day  
Memorial Day  
July 4th  
Labor Day  
Veterans Day  
Thanksgiving Day  
Friday after Thanksgiving Day  
Christmas Day

If a holiday falls on a Saturday, it will be observed on the Friday before. If a holiday falls on a Sunday, it will be observed on the Monday after

### **Exceptions and Extensions to the above are:**

- Construction on residential property relating to temporary projects for the maintenance or repair of homes, grounds, or appurtenances is allowed between 7 a.m. and 10 p.m. any day of the week.
- Exemptions and exemptions in accordance BMC 8.26.065 and documented on an approved City construction permit.

These guidelines will not limit or prohibit more restrictive hours for work authorized under a development permit issued under BMC 14.

## 1-5 GUARANTEES, BONDS, AND INSURANCE

Before any permit is issued, the Developer must provide insurance for all public works improvements. Acceptable guarantees are:

1. Performance Bond
2. Maintenance Bond
3. Assignment of Funds
4. Cash-Set-Aside Agreement
5. Cash Deposit
6. Irrevocable Standby Letter of Credit

Standard forms of these documents, acceptable to the City, available upon request. Substitutions or changes to the standard forms require advance review and approval by the City Attorney. The Developer will be responsible for the cost of the legal review. The Developer must submit to the Public Works Director a written request to deviate from the standard form.

### 1-5.1 PERFORMANCE BONDS

Performance guarantees are required for all TESC measure improvements located in the public right-of-way, as detailed on the approved plans, including utilities and drainage construction in accordance with BMC 12.18, 17.09, 18.04, 18.03, 18.06, and other applicable sections.

The Developer must provide to the City a detailed cost-of-construction estimate for the improvements, prepared by a civil engineer licensed in the State of Washington, and based on the approved plans. The estimate must itemize descriptions, quantities, and unit costs. The data is reviewed by the Public Works Director and used to determine the performance bond amount.

The performance bond amount will equal 120 percent of the cost-of-construction estimate. The estimate should be submitted as early as possible during the review process to allow adequate review time and to avoid delays in the permit issuance process.

TYPICAL BONDS REQUIRED – PRIOR TO PERMIT ISSUANCE		
Street or Alley	Drainage/Grading (Public and Private)	Public Utilities
Estimated cost of improvements plus 20 percent (\$1,000 minimum)	Estimated cost of temporary erosion control plan installation and maintenance plus 20 percent (\$1,000 minimum)	Estimated cost of improvements plus 20 percent (\$1,000 minimum)

Before the City will release the performance bond or surety, the Developer must:

1. Record all easements with the respective County.
2. Request a final inspection, complete corrections as identified by the City construction inspector, and obtain final approval of the work.
3. Provide mylar and digital record drawings of the improvements for review by the City construction inspector. Before record drawings will be accepted by the City, the Developer must make all modifications to the record drawings as directed by City Engineer or City construction inspector. See 1-14.
4. Post a maintenance bond or other surety accepted by the City. See 1-5.2.

### **1-5.2 MAINTENANCE BONDS**

A two-year maintenance bond, or other surety acceptable to the City, is required at the time of final acceptance of the constructed public works improvements in accordance with BMC 12.18, 17.09, 18.04, 18.03, 18.06, and other applicable sections. The maintenance bond amount will normally be equal to 10 percent of the documented final cost of the improvements. The maintenance bond must be in place before the City releases of the performance bond.

### **1-5.3 INSURANCE**

Before the issuance of construction permits, the Developer must provide a Certificate of Insurance on forms approved by the City Attorney. The insurance must be in the amount of \$1,000,000.00 per occurrence. The Certificate of Insurance must name the City as “additional insured” and must not be cancelable without 30 (thirty) days of written notice to the City. The surety company must be authorized to transact business in the State of Washington.

## 1-6 PERMITS

Various permits are required for an individual project based on the scope of the project proposal and conditions established during pre-application, pre-design meetings, and during the permit approval process. The Developer must submit all necessary documentation, according to the requirements established for each permit. The Developer must submit proof that all contractors and subcontractors have obtained a Bothell business license and a Washington State License from the Department of Labor & Industries.

Questions about permit requirements should be directed to Development Services. Depending on the project, the Developer may be required to schedule and attend a pre-application meeting before completing and submitting permit documents.

The Developer must ensure that an approved permits and construction plans are available on the job site whenever work is being performed on any portion of the project.

[Application for Fire Flow and Water Sewer Availability](#) (WSA), commonly known as Form 36, is required for any new construction, change of use, and building additions. An approved WSA is valid for two years from the date of approval.

## **1-7      LEGAL RELATIONS AND RESPONSIBILITIES**

The Developer must at all times comply with all federal, state, and local laws and ordinances, and any regulations that affect the project.

The Developer and their contractor must release, indemnify, and promise to defend and hold harmless the City, its employees and public officials from all liability, loss, damage, expense, action, and claim incurred by the City in defense of or arising on account of any violation of laws, ordinances, or regulations whether such violations are by the contractor, their subcontractors, employees, or agents.

## **1-8 DEVIATION FROM STANDARDS**

Allowable changes or modifications to these Standards are reviewed and approved by the Public Works Director based on evidence submitted by the Developer. The evidence must prove that the proposed modifications are equal to or better than the requirements in these Standards, are in the public interest, are based on sound engineering judgment, and that requirements for safety, function, appearance, and maintainability are fully met. Requests for changes or modifications to these Standards must be submitted during the permit process to allow time for a decision by the Public Works Director before construction.

All other alternatives will be reviewed according to the process pursuant to BMC 11, 17, and 18. Such requests may require the Developer to sign an agreement for extending the permit processing time frame if it is subject to the regulatory reform process.

# 1-9 PLAN REVIEW

## 1-9.1 FORMAT AND REQUIRED DATA

The following criteria must be followed without exception:

1. Construction plans must be submitted consistent with the Community Development Department's most recent electronic permit submittal policy. Digital files must be in one of the following formats:
  - a) AutoCAD to include all reference files, fonts, CTB file, and a layer index describing the data found on each layer.
  - b) ArcGIS .GDB, .MDB or .SHP

Additionally, digital images of all plan sets must be provided as either multi-page PDFs or individual TIFF images with each sheet as a separate image and following State of Washington requirements for producing digital images for archive purposes. See WAC 434-663.
2. Digital files must be drawn and submitted in the correct spatial registration using City datum and survey control network based on NAD 1983/1991 Washington State Plane North coordinates. All elevations and grades on public works construction plans must be to City of Bothell datum and NAVD 88 Elevations.
3. Civil engineering, new development, capital improvement project plans, or utility improvements must be prepared either with sheets printed in plan and profile, or with separate sheets for plan and profile views. The standard sheet size is 24 inches by 36 inches.
4. Depending upon the complexity of a drawing, more than one drawing may be submitted. If not clearly described by the specific layer name, an index indicating what layer data corresponds to each layer name must also be provided.
5. The following information must be provided digitally and on plans:

Bridges	Right-of-way easements
Commercial building footprint	Rivers
Concrete structures	Road centerline
Contours over the site	Sanitary sewer utilities (existing or proposed)
Creeks	Sidewalk
Curbing (concrete or asphalt)	Signs (regulatory, information, warning)
Edge of pavement	Soil types and drainage information
Existing septic systems	Storm drainage utilities (existing or proposed)
Floor plan with interior or exterior walls and partitions	Streetlights
Guardrails	Underground oil tanks
Monuments	Walkways
Parking areas	Wetland buffers
Pavement markings	Wetlands boundaries
Pervious hardscapes	Water utilities (existing or proposed)
Planters	Streams and stream buffers
Property lines	Only that text that describes each portion of all pipe inverts, CB and MH rims, pipe size, pipe material, utility name, (ss, sd, or w), or Flow arrows
Retaining walls (wooden, rock, concrete)	

6. Plans must be prepared with all utilities, both new and existing, shown on all sets of plans. For example, on the sanitary sewer plans, the water and storm drains must be shown half toned with the sanitary sewer portions being heavily highlighted. Other utilities must be shown in profile views where crossings occur. Provide a legend of existing and proposed improvements on the first sheet of each drawing type (i.e., water, sanitary sewer).
7. A profile of all utilities including storm, sewer, and water must be provided.
8. Whenever possible, use notes specifying Standard Detail numbers for common items such as catch basins, restrictors, fire hydrant assemblies, etc.
9. Show the existing and proposed right-of-way and channelization of all streets that front the proposed development. Show contours, street improvements, including all curb cuts, within 200 feet of the subject property, on both the adjacent properties and the properties across the streets that front on the proposed development.
10. Show complete data for curb radii, new and existing utility locations, curb elevations, street stationing, street widths, existing adjacent improvements, elevations of existing street improvements, and utilities.
11. All existing and proposed improvements must be located and dimensioned with datum to City of Bothell survey monuments, monument lines, or street centerlines. Dimensioning must be completed by stationing and offset from these control lines.
12. For development projects, a summary of quantities for all work within the public right-of-way or in easements granted to the City must be listed on the title sheet or on the first sheet of all plans or sets of plans.
13. The following list can be used as a guideline for the items to be quantified, but is to be supplemented as necessary for a particular project:

Impervious area (list both public and private) .....	Square feet
Ductile iron water main (size).....	Linear feet
Water service .....	Linear feet
Meter sets (size).....	Each
Water main line connections.....	Each
Sewer lateral connections .....	Each
Sewer main/manhole connections to existing.....	Each
Concrete, PVC, HDPE, or DIP sewer main (size) .....	Linear feet
Concrete, PVC, HDPE, or DIP side sewer (size).....	Linear feet
Sewer manholes (type).....	Each
Sewer clean-outs .....	Each
Concrete storm, PVC, or HDPE drain pipe (size) .....	Linear feet
Catch basins (type).....	Each
Fire hydrant assemblies .....	Each
Water main blow-offs.....	Each



For road and street construction, the following information must be documented:

1. Match lines with matched sheet number must be provided where plan is drawn on two or more sheets. Where plan is shown on three or more sheets, include a total site plan index map at scale to cross-reference portions of the project with their corresponding plan sheet location. Example: one (1) inch equals 100 feet.
2. All division or phase lines must be indicated showing proposed limits of construction.
3. Existing and proposed topography contours must cover the entire site and minimum of 30 feet beyond the site boundary. Existing topography should be screened to one-half tone. Topography contours must be shown at 2-foot intervals or 5-foot intervals for slopes greater than 15 percent, and 10-foot intervals for slopes greater than 40 percent. Elevation labeling must be shown at 10-foot intervals maximum.
4. Show and clearly label property lines (with distances and bearings), right-of-way lines, sensitive areas and setbacks, and all existing easements with their recording numbers, and proposed easements. Show existing and proposed building footprints.
5. Label all streets with City of Bothell names.
6. Plans must include a key for abbreviations and a legend for symbols where such are used.
7. In addition to the drafting standards listed below, the following information should be included within the utility and transportation plans as appropriate.
  - a) Show existing and proposed street lighting system on a separate drawing. Include all pole locations, luminaire and pole types, junction boxes, sources of power, conduit and aerial runs, and foundation details.
  - b) Show existing and proposed traffic signal interconnect runs.

#### **1-9.2 DRAFTING STANDARDS**

When construction plans for site improvements, including water, sewer, storm drainage and transportation improvements, are prepared and are to be constructed within the Bothell city limits or service area, the project plans must meet these standards and requirements:

1. The Professional Engineer's seal, signature, address, and phone number must be placed in the title block area in the lower right portion of each sheet.
2. The drawing must include both paper and PDF files of all plan sheets. No "sticky-back" or pasted pieces will be allowed. The base map showing existing features must be screened to one-half tone.
3. Use horizontal scale of one (1) inch equals 20, 30, or 40 feet and Vertical Scale of 1 inch equals five (5) feet unless otherwise required or approved by the Public Works Department. Note: complex utility locations may require a larger scale plan to show the necessary detail.
4. Draw the plan so the north arrow points to the right or to the top of the sheet.
5. Control line distances and features must not have error greater than 0.2 feet (scaled distance) on a 20-scale drawing.
6. Use of a lettering guide is preferred, but very neat, legible, freehand lettering is acceptable. The minimum lettering size is 0.5 cm or 0.2 inches. This is to ensure the plan is legible after microfilming or reduction to one-half size.
7. Use the standard APWA symbols as supplemented by current Bothell Standards.

### **1-9.2 REQUIRED DRAWINGS**

The permit application submittal must include the number of plan sets specified on the applicable intake checklist and two copies of the Storm Drainage Report. At a minimum, the following items must be included in the plan set. Additional elements may be required, depending on project requirements.

1. Title Sheet with vicinity map, index map (if appropriate) and references to Bothell Standards.
2. Site topographic and horizontal control plan.
3. Temporary erosion and sedimentation control plan.
4. Grading plan.
5. Street improvement plan. (Separate cross section work sheets are required for all new street construction. Distance between cross section locations must be typically at 50 feet stations, or as determined by the Public Works Director based on site topography.)
6. Storm drainage/detention plan/profile (drainage and street plans may be combined together).
7. Sanitary sewer plan/profile.
8. Water system plan/profile.
9. Landscaping plan (plans to illustrate water, sewer, and storm lines and easements).
10. Composite utility plan.
11. Illumination system plan.
12. Preliminary traffic control plan and/or detour route (at the discretion of the Public Works Director).
13. Cross-sections of existing and proposed construction, as may be required by Public Works Director.
14. Details and specifications for the above improvements, including duplicate copies of all standard details referenced on the plan and in the notes.
15. Driveway schedule.

#### **1-9.2.1 Title Sheet**

Each submittal must contain the following project information on the title sheet or first sheet:

1. Title: Project name (add explanatory note if project name has changed).
2. Table of contents (if more than three sheets).
3. Vicinity map (scale sufficient to cover project limits on one sheet or one (1) inch = 200 feet, whichever is greater).
4. General description of site, including quarter section, township, and range.
5. Name and phone number of engineering firm preparing plans.
6. Index map to sheets, as appropriate.
7. City of Bothell Land Use Permit number.
8. Description of type of land use.
9. Description of units/size of project.
10. Parking summary (if applicable).
11. Name and phone number of all utility providers.

### **1-9.2.2 Site Topographic and Horizontal Control Plan**

Show all existing underground and surface improvements and topography in proximity to the project. The information must be shown for the full width of the right-of-way or the easement and for a sufficient distance (typically 200 feet) on either side of the right-of-way or easement to show possible impacts on adjacent properties and/or the relationship to related facilities.

Information on existing surface and underground City of Bothell facilities may be obtained from the Public Works Department. Other utility information may be obtained from the utility owners.

1. Label each section and detail in the plans. Section and detail labels must be shown on both the plan and the section detail, and must include assigned section and detail numbers and plan sheet location number.
2. Sewer, water and drainage improvements: Provide profiles of all proposed sewer, water, and storm drain lines. Show existing underground improvements within 10 feet of where they cross or connect to the new improvements. Show the stormwater drainage discharge point to a public system or natural water course. Provide drainage system details, whether or not detention of stormwater is required. Label all private facilities.
3. Grades: All profile and cross sections must show the proposed as well as the existing grade. Utility plans must indicate invert elevations of pipelines at all crossing points. Include grade percent call-outs for all streets and driveways.
4. All water mains must be within utility easements granted to the City of Bothell in a form acceptable to the City. The easement width will vary according to pipe diameter and depth, but must not be less than 15 feet wide, and must include area sufficient for all necessary appurtenances such as hydrants, valves, meters, blocking, etc. Easements must be shown on the water main plan sets.
5. Public sanitary sewer and storm drain lines not within the street right-of-way must be within easements granted to the City of Bothell in a form acceptable to the City. The easement widths will vary according to pipe diameter and depth, but must not be less than 15 feet wide. Easements must be shown on the sanitary sewer and/or storm drainage plan sheets. (See 1-9.3).
6. Stationing must be provided on all centerlines and reference lines. All intersection street centerlines, utility crossings, right-of-way lines, property lines, railroad crossings, drainage structures, and signal and light poles must be referenced by station and offset. Curve data must be provided for roadway centerline and right-of-way curves. All PCs, PTs, PRCs, PCCs and APs must be stationed and offset.

### **1-9.2.3 Temporary Erosion and Sediment Control (TESC) Plan**

The TESC plan should show the following:

1. Existing and proposed topography.
2. Clearing limits.
3. Location and details for construction entrance.
4. On-site tire wash at construction entrance.
5. Construction sequence.
6. Provision for perimeter runoff control at property boundaries.
7. All cut and fill slopes.
8. All details necessary to illustrate the intent of the TESC plan.
9. Show interim catch basin sedimentation protection.
10. Show all drainage pipes and ditches. Include pipe inverts, minimum slopes and cover, and ditch grades and dimensioning.
11. Specify areas to receive special treatment such as jute matting, rock lining, sod, mulching, and seeding.
12. Provide all necessary dimensioning and details for sediment traps, berms, pond storage, pond outlet structure, filtering devices, inlet/outlet stabilization techniques, control/restrictor devices, rock check dams, silt fabric fences, pond inlet baffles, and other design elements.
13. In addition, the plan must comply with the regulations listed in Chapter 4 - Bothell Surface Water Design Manual.
14. Standard Notes for TESC required (Appendix C)

### **1-9.2.4 Grading**

#### **1-9.2.4(1) General**

The site grading plan must show all existing and proposed grades, and may be incorporated or combined with the Site Topographic and Horizontal Control Plan.

#### **1-9.2.4(2) Standards**

All grading must comply with Bothell Standards 2 and 18.05, which adopt Appendix J of the International Building Code cited in BMC 20.

### **1-9.2.5 Street Improvement Plan**

Roadway Improvements include but are not limited to paving, curbs, gutters, sidewalks, driveways, curb ramps, storm drainage structures, street lighting, traffic signals, signing, channelization, and landscaping.

1. Establish a base line or centerline adequately dimensioned from at least two known reference points or monuments approved by the City of Bothell.
2. Adequately dimension all improvements from the established base line or centerline.
3. All plans must be stationing, with the true point of origin for stationing dimensioned from a monument. If 0+00 stationing point does not coincide with

a monument, tie in with station equation. Stationing should increase from left to right or bottom to top.

4. When possible, street improvements in the right-of-way should have a profile drawing beneath a plan view.
5. Provide cross-sections at maximum 50-foot intervals and major topographical features (closer spacing may be required based on conditions) to ensure that proposed improvements will correspond with existing conditions and with City ordinance requirements for improvements. Provide spot elevations at the centerline of roadway, edge of existing asphalt, and face of a proposed curb.
6. Provide adequate information on roadway geometry, including PC, PT, PRC, PCC, AP, radius, curve angle, tangent length, curve length, and all other information required to adequately establish the geometry. Provide adequate information on roadway profile, including vertical curve approach grades and length of vertical curve and all other information required to adequately establish the profile.
7. Provide spot elevations and slope call-outs where improvements abut with existing pavement. Show top of curb elevation at suitable intervals along curblines, and all break in grades. If the plan is separate from the profile, show top of curb elevation at all curb returns at intersections and at backs of cul-de-sacs.
8. Provide profile drawings for all private roads, shared use trails and trail crossings, and for driveways where the slope exceeds 5 percent.
9. Include all referenced Standard Details in plans.
10. Show bearings for all new roadway alignments.
11. Clearly call out and dimension existing and proposed right-of-way.
12. Show all existing and proposed easements on plans.
13. Design street lighting, signals, signing, and channelization, per Bothell Standards, and include appropriate Standard Details. Also include a table of wiring schedule, wiring schematic, table of luminaire schedule, notes, and details.
14. Plans for special structures must be full dimensional and must show complete construction elevations and loading diagrams, when applicable. All plans must provide the necessary detail required for preparation of bar schedules and bar placement without the necessity of making separate shop or placement drawings. Structural steel use must include such detail that shop drawings can be prepared without additional design.
15. Standard Road Construction Notes Required (Appendix C)

#### **1-9.2.6 Storm Drainage/Detention Plan/Profile**

1. Label all clean outs and catch basins in sequential number, indicating size and type. In profiles, label rim and invert elevations of catch basin and manholes.
2. Include flow direction arrows on all storm drain lines.
3. Label pipe size, length, material, and slope in profile.
4. Include datum and benchmark information on title sheet.
5. Show spot elevations of pavement in parking lots, and runoff flow direction arrows.

6. Show roof leaders and footing drains connecting into the conveyance system.
7. Show all stub-out locations for future connections.
8. Show location of rockeries and include section details for rockeries in grading plans.
9. Show the following for all stormwater facilities:
  - a) Show and label at least two cross sections through a detention pond. One cross section must show the control structure.
  - b) Show location and detail of emergency overflows and spillways.
  - c) Provide invert elevations of all pipes, inlets, tanks, vaults, and spot elevations of the pond bottom. Call out pond volume and dimensions and design surface elevation.
  - d) Provide plan and section views and details of all rock protection and energy dissipaters.
  - e) Section and plan view on restrictor/control structure must be shown and adequately detailed, including size and elevation of orifices.
  - f) Show length, width, and bottom width dimensions for all biofiltration and water quality swales and stormwater conveyance swales. Include sectional view, showing side slopes and design depth of flow.
  - g) Include seeding material information.
10. Standard Notes for Storm Drainage required (Appendix C)

#### **1-9.2.7 Sanitary Sewer Plan/Profile**

1. Label all manholes and clean outs in sequential number. Label rim and invert elevations and manhole size and type.
2. Include flow direction arrows on all sanitary sewer lines.
3. Label pipe size, length, material, and slope in profile.
4. Show all stub-out locations for future connections and side sewer connection stubs.
5. Standard Notes for Sanitary Sewer Main Installation required (Appendix C).

#### **1-9.2.8 Water System Plan/Profile**

1. Show “before” and “after” connection details for water main connections. Refer to Standard Details for samples of connection details.
2. For utility crossings that involve vertical offsets in a water line, provide cross sectional detail showing the crossing, including vertical bends, blocking, shackle rods, and pipe invert elevations.
3. Call out types of fitting connections (MJ=mechanical joints, FL=flanged, PE=plain end, RJ=restrained joint).
4. Hydrants must be free and clear of all structures, landscaping or other interferences for a minimum of 5 feet of clearance around the hydrant.
5. Show Standard Details for the following items:
  - a) Fire hydrants.
  - b) Appropriately sized water services.

- c) Water service meters and master meters.
  - d) Temporary or permanent blow-off, when used.
  - e) All valves in the distribution system.
  - f) Air-vacuum release valve, when used.
  - g) All backflow prevention assemblies.
  - h) Details of water main connections. Note that the correct detail(s) should be selected, and modified to suit the project conditions.
  - i) Vaulted appurtenances - i.e., control valves, fittings, etc.; piping systems.
6. Plans for water mains located in easements over, on, and across private property must contain the following information and standards:
- a) Locate water mains in driving lanes (not under parking stalls).
  - b) Show locations of all hydrants (proposed and existing) within 300-feet of site.
  - c) Show location and size of cross-connection control assembly [Note: could be a Double Check Detector Assembly (DCDA) or a Reduced Pressure Principle Detector Assembly (RPDA)] for fire sprinkler vault or enclosure. Also, show the location of fire department connections, direction of pumper ports, and distance from curb.
  - d) Show the size and location of domestic water meters and of irrigation water meters and the associated cross-connection control assembly.
  - e) Show location of carports, dumpsters, and mailboxes.
  - f) Show primary hydrant within 150-feet of structure, and no closer than 50 feet.
  - g) Hydrant service must be 8 inch diameter if over 50 feet from main.
7. Standard Notes for Water Main Installation required (See Appendix C).

#### **1-9.2.9 Landscaping Plan**

The development of landscaping and erosion control is to conform to BMC 20 and the Bothell Standards. Landscaping is required on all projects to provide visual orientation for traffic safety; to create physical delineation of parking areas, and to furnish definition and scale of the entire complex by interval plantings and to ensure the preservation of land values by creating an environmental quality that complements the objectives of the respective land uses in any zone. A copy of the Zoning Code is available from the Community Development Department.

To ensure adequate sight lines for visibility, all plans with center boulevard medians must design plantings to minimize sight obstructions and to conform to the clear area described in Standard Detail 337. In addition, no one may plant any vegetation, erect any structure, or perform any action that results in obstructing the view of a fire hydrant for a distance of 100 feet on either side of the fire hydrant along the roadway. The owner/occupant of any area in which a hydrant is located is responsible for removing weed and tree growth from around the hydrant for a distance of no less than 10 feet. The landscape plan set must include a composite of the water, sewer, and storm utilities.

#### **1-9.2.10 Composite Utility Plan**

Include a composite utility plan sheet showing existing utilities (half tone) and all new utilities including proposed tree and landscape locations. The composite utility plan must show all underground utilities and all associated surface improvements that include the locations of the sewer and storm drain laterals, water meters, fire hydrants, street lighting standards, traffic signal poles, mailboxes, transformers, telephone risers, utility vaults, etc., to establish clearances. Underground utilities of concern include sewer, storm drain, water, power, cable TV, telephone, street lighting, traffic signal wiring, gas, and overhead electric/telephone/cable facilities. Show locations of relocated overhead utilities and poles where applicable.

#### **1-9.2.11 Traffic Control and Detour Plan**

A preliminary plan may be required with a permit application submittal.

##### **General**

Traffic control for all projects must comply with Chapter 6 of the Manual on Uniform Traffic Control Devices (MUTCD). The Developer must plan, furnish and maintain all required labor and materials necessary to protect the public and workers during the course of construction. The Developer must submit a proposed traffic control plan for review and approval prior to initiating the work.

The Developer must conduct operations so as to cause the least possible obstruction and inconvenience to the public, and must have under construction no greater length or amount of work than he can prosecute properly with regard to the rights of the public. The Developer must not open up sections of the work and leave them unfinished, but must finish the work as he goes insofar as practicable.

Unless otherwise approved in writing by the Public Works Director, all public traffic must be permitted to pass through the work with as little inconvenience and delay as possible. The Developer must keep existing roads and streets adjacent to or within the limits of the project open and maintained in a good and safe condition for traffic at all times. The Developer must remove any deposits or debris and must repair any damage resulting from their operations. Construction must be conducted so as to cause as little inconvenience as possible to abutting property owners. Convenient access to driveways, houses, and buildings along the line of work must be maintained. Emergency access must be maintained to all residences and businesses at all times unless special arrangements have been prepared by the Developer and approved by the Fire Marshall prior to starting work.

##### **Detours, Lane and Street Closures**

Advance approval must be received from the Public Works Director for all proposed detours and lane and street closures. A formal traffic control plan complying with the MUTCD must be submitted for review at least 10 working days prior to scheduled closure. Longer review times may be necessary where notices to the public are required and mailings, signing, and newspaper publication requirements dictate longer times for coordination. Approval by the Public Works Director is required prior to the start of work. Notification must also be given to the police, fire, postmaster, school district, solid waste removal provider, and Metro and Community Transit to allow advance planning



of travel routes. Street closures require posting road closure signs in each direction of affected travel seven days in advance of the closure.

### **Haul Routes**

The Public Works Director has the authority to determine truck haul routes related to grading and construction activities. Where reasonable alternative routing of construction-related vehicles can occur, as determined by the Public Works Director, haul routes may be designated to minimize construction-related impacts on residential streets or other roadways not intended for heavy truck use.

### **Flaggers, Barricades, and Signs**

Licensed flagger(s), barricades, and signs must conform to the standards established in the latest edition of the MUTCD. The Developer must prepare a traffic control plan showing the required construction signing, barricades, and flagger(s) for the project. The plan must be submitted to the Public Works Department for review and approval at least 10 working days before the signing and barricades will be required. All equipment and materials required for traffic control must be furnished, installed, and maintained by the Developer to the satisfaction of the Public Works Director.

During construction activity at signalized locations, an off-duty, uniformed police officer is required at all times the signal or beacon is turned off, or when the traffic signal indicator is countermanded, or if the Public Works Director determines it is necessary for traffic control. Officers are also required for new traffic signal work. A uniformed police officer must be provided at the expense of the Developer. For information on police officer availability, call the Police Department at 425-486-1254.

### **Driveway Schedule**

A Driveway Schedule must be provided for proposals with three or more new access points. The schedule must list all of the driveways, both residential and commercial, being constructed and must include the following information pertaining to each driveway, in tabular form:

1. Location of driveway
2. Width
3. Length
4. Surface type
5. Profile grade (may require separate sketch)
6. Separation distance either side of driveway to nearby driveways or intersections.

### 1-9.3 EASEMENT CRITERIA

Utilities improvements that are to be a part of the public system and represent a part of the City's capital improvements must be constructed in public rights-of-way or easements. Easements to accommodate utilities must also be provided for projects that require new roadway construction or widening of existing roadways. This includes subdivisions, short plats, planned unit developments, binding site plans, and certain building projects. The zoning code may establish additional requirements for right-of-way dedications, setbacks, and site improvements.

A non-exclusive easement must be reserved for and granted to all utilities (and their respective successors and assigns) serving the Developer's project. The exterior easement must be 10 feet wide, located parallel to and contiguous to the street right of way, across the frontage of all lots, tracts, and common areas. The utilities may use the easement to install, lay, construct, renew, operate, and maintain underground conduits, cables, pipes, and wires, together with other necessary facilities and equipment. The easement must provide right-of-entry upon the easement at all times for maintenance and repair of necessary facilities.

All other easements for public utilities must be a minimum of 15 feet in width. The Public Works Director may require greater easement width to accommodate larger pipe sizes, access needs, or other special requirements.

All easements must have a minimum 5 feet building setback line (BSBL) from each edge of the easement. All easements must be located to run within single lots adjacent and parallel to property lines, rather than being split by a lot line, unless otherwise approved by the Public Works Director due to special circumstances. BSBLs may cross into adjacent property. No permanent structures or fences are allowed to be constructed within the easement area.

Landscaping within easements is restricted to low growing, non-invasive type shrubs, grasses, beauty bark, etc. Vegetation-based LID BMPs such as swales and bioretention facilities may be permitted within require easements, where no other feasible locations exist. Where LID BMPs such as bioretention facilities are located within utility easements, provisions must be in place to ensure their restoration should utility work occur. In addition, paved vehicular access will be provided to all manholes, except as specifically approved by the Public Works Director. For storm and sanitary sewers, the guiding criteria should be that the upstream and downstream manholes must be accessible and within 300 feet of the inaccessible manhole to allow for clearing blockages within all lines. Inaccessible off-street valves and manholes must have a concrete pad installed around them with marking post or carsonite marker construction details.

All easements must be dimensioned and accurately drawn on all plans sheets and the final map. All easements not directly related to the recording of a final plat must be recorded before final PUD, plat, or project approval is granted, or before any certificates of occupancy are issued.

The following information must be provided to the City for all easements:

1. A legal description(s) of the easement certified by a licensed professional land surveyor.
2. A current title report covering the properties to be encumbered by the easement.
3. A scaled drawing on an 8 ½ inches by 11 inches sheet must accompany all legal descriptions, showing the easement in a clear and legible manner, with bearings and distances along all sides

and the centerline and distances to any visible physical appurtenances such as fences and structures.

The following information must be provided to the City on the construction plans for all easements:

1. Easement width and location.
2. Location of the utility within the easement.
3. Distance from the utility line to the easement centerline.
4. Water mains, sanitary sewers, and storm drain lines will normally be located on the easement centerline.

An easement granted to the City for the placement of public utilities must be submitted on the City's standard easement form. After acceptance of the dedication is acknowledged on the face of the document by the appropriate City official, the easement must be recorded with the Snohomish County Recording Division of the Auditor's Office or the King County Recorder's Office, depending on where the easement is located.

# **1-10 PROTECTION OF PROPERTY AND UTILITIES**

## **1-10.1 PRECONSTRUCTION MEETING**

A preconstruction meeting must be held at the City of Bothell with Development Services prior to any construction work being performed by the Developer. Prior to the preconstruction meeting, the Developer must have in their possession, construction plans approved by the City, and all required City permits necessary to perform the work, which may include, but are not limited to: City business license, right-of-way permits, and grading permits,. The Developer must also have any and all permits required by other outside agencies.

The person who will be responsible for completion of the work must be present during the entire preconstruction meeting. The Developer must coordinate the meeting time with the Development Services Project Coordinator.

## **1-10.2 INSPECTION OF WORK**

The Developer must give the City timely notice that the work, or any part thereof, that has been constructed within the City's service area is ready for inspection. In no event may the work, or any portion thereof, be covered up or placed into operation until the City construction inspector has directed otherwise. If any work has been covered up without prior inspection or authorization by the City construction inspector, it must be dug up for inspection at the discretion of the City Engineer or designee, at the Developer's expense.

Whenever deficiencies have been discovered through random investigative inspections of "like" components, the Developer is responsible for digging up, and/or exposing all questionable "like" components for complete and thorough inspection at the Developer's expense.

For inspections required on private property due to issuance of permits by the City, the City retains the right to enter the subject property at reasonable times for purposes of inspection for compliance with permit conditions. The Developer must provide access for the City inspector.

To ensure the inspector's safety and access during these inspections, the Developer must provide any equipment needed, such as walkways, railings, ladders, and platforms. When the inspector requests, the Developer must (without charge) provide samples of materials used or to be used in the work. Inspection by the City does not relieve the Developer of their obligation to furnish satisfactory material and workmanship.

## **1-10.3 FINAL INSPECTION OF WORK**

Before acceptance by the City, and after to release of final occupancy clearance, all materials and completed work are subject to final inspection by the City construction inspector.

Prior to final acceptance, all items as identified by the City construction inspector as needing additional work must be completed and re-inspected to the satisfaction of the City construction inspector.

## **1-10.4 PROPERTY**

The Developer must protect and preserve from damage, interference, and destruction all private and public property on or in the vicinity of the work. If such property is damaged or destroyed, or its use

interfered with by the Developer or their agents, it must be restored immediately to its former condition or better by the Developer at their expense and such interference terminated.

#### **1-10.5 UTILITIES**

The Developer must protect from damage private and public utilities, including telephone and cable television lines, power lines, sewer, water, and storm drain lines, railroad tracks and appurtenances, highway lighting and signal systems, and similar facilities. Before beginning any excavation, the Developer must provide notice of commencement to all owners of underground facilities through the one number locator service, phone number 1-800-424-5555 (or 811), if available; if not the Developer must give notice to all individual utility owners. Such notice must not be less than 2 nor more than 10 business days before the scheduled date of excavation.

## 1-11 SITE MAINTENANCE

The Developer and contractor must schedule and control the work so as to prevent all hazards to public safety, health, and welfare.

1. The Developer must ensure that no project-related dust, dirt, or construction debris remains on any public roadway. Streets must be cleaned of dirt and debris on no less than a daily basis, at the end of the day. In addition, the Developer must supply a roadway sweeper to clean up public roadways that have been burdened by the project's construction debris within 24 hours of verbal or written notice by the Public Works Director.
2. Pedestrian facilities must be kept free of hazards and obstruction, and continuity must be maintained at all times, unless otherwise approved by the Public Works Director
3. On existing streets, two-way traffic must be maintained at all times, unless lane closures or detour plans have been approved in advance by the Public Works Director.
4. Pedestrian and vehicular access to occupied buildings must be maintained at all times, except where approval from the building owner has been obtained.
5. Access to mailboxes must be provided during construction.
6. City-owned infrastructure (i.e., manholes, valve boxes, meters, etc.) must be accessible at all times.
7. New structures or fixtures must be protected by six (6) inch x six (6) inch timbers or bollards during construction.
8. All projects requiring a grading permit must display a construction sign. The sign should be a minimum of 12 square feet and display the physical address at the top, name of the project and short description, estimated completion date, permit numbers, Developer contact information including phone number, and emergency phone number available 24 hours a day, seven days a week. It may also include contractor contact information.

# 1-12 CONTROL AND INSPECTION

## 1-12.1 GENERAL

Work performed on construction or improvements within the City, whether by a private Developer, a City contractor, or City forces, must be completed in accordance with the approved plans and specifications and to the satisfaction of the Public Works Director.

Work cannot start until plans are approved. Any revision to plans must be submitted by the Developer's engineer to the Public Works Director for approval, prior to performance of the work.

The Public Works Director will have authority to enforce these Bothell Standards as well as other referenced or pertinent specifications and will appoint project engineers, assistants, and inspectors, as necessary, to inspect the work for compliance.

## 1-12.2 MATERIALS SAMPLING AND TESTING

### 1-12.2.1 Developments

It is the responsibility of the Developer to provide test reports, certified by a professional engineer licensed in the state of Washington, to verify compliance of materials used in the project. Sampling and/or testing must be at a frequency and magnitude determined by the Public Works Director. Copies of all test reports must be furnished to the Public Works Director. All costs incurred for testing or sampling, as required, must be borne by the Developer.

### 1-12.2.2 City Inspection of City Contractors

Construction work performed by City contractors must be inspected by City inspectors or contract inspectors reporting directly to the City. Sampling and testing is to be performed by City inspectors or by an independent professional testing laboratory.

### 1-12.2.3 Notification of Inspection

The Developer must notify the City of inspection needs in a timely manner. In general, inspections must be either phoned in to the City Inspection Line or requested through the City's online permitting portal by 4PM for inspection the following business day.. Failure to provide adequate advance notification may oblige the City to arrange appropriate sampling and testing after-the-fact, with certification by a qualified private testing laboratory. Costs of such testing and certification is to be borne by the Developer.

## **1-13 ASBESTOS CONTROL**

The Developer must refer to the Puget Sound Clean Air Agency for identification, inspection, reporting, handling and removal of materials containing asbestos. Asbestos-containing material (ACM) may be encountered during a construction project in the form of asbestos cement pipe, pipe insulation, or as insulation in a structure that is being demolished. It can be found in pipe for water and sewer mains, electrical conduits, drainage pipe, and vent pipes, etc. Normal breakage and crushing of the material can cause an asbestos fiber release that presents a serious respiratory hazard. It is imperative that asbestos fiber release be controlled. Citations by regulatory agencies for an asbestos fiber release carry substantial fines.

When required by applicable laws and regulations, the Developer must have all asbestos legally removed from the site and properly disposed of by a state licensed asbestos contractor in accordance with the practices specified by the Washington State Department of Ecology, the King or Snohomish County Solid Waste Division and all other pertinent state and federal regulations. See WAC 296-62-077.



# 1-14 RECORD DRAWINGS

## 1-14.1 PRIVATE DEVELOPMENT

Final acceptance of the improvements or final certificate of occupancy, whichever happens first, will be withheld until the record drawings, also known as as-builts, have been submitted and approved. Record drawings must be prepared in accordance with the following:

1. The Developer/contractor must supply the City construction inspector with record drawings construction plans, bearing the stamp and signature of either a registered professional engineer or a registered professional land surveyor. These drawings must show any and all changes in the final locations of all items of work including, but not limited to: curb and gutter, sidewalks, street lighting, fire hydrants, storm drain lines, water lines, sewer lines, catch basins, manholes, underground oil tanks, septic tanks, fire hydrants, valves, new and existing utilities, abandoned in place utilities, and their appurtenances included in the work. Refer to specific chapters of these Standards for requirements for each type of work. The Developer must make all changes to the record drawings required by the City construction inspector before submitting the final record drawings in digital format for City acceptance.
2. All final record drawings must be submitted in digital format, on CD-ROM, DVD, OneDrive, or published to a City Public FTP site in one of the following formats:
  - a) AutoCAD (include all reference files, fonts, CTB file, and a layer index describing the data found on each layer.
  - b) ArcGIS .GDB, .MDB or .SHP

In addition to one of the above, digital images of all plan sets must be provided as multi-page PDFs and individual TIFF images (each sheet as a separate image), using the state's requirements for producing digital images for archive purposes. Please see WAC Title 434 Chapter 434-663.
3. All digital files must be drawn and submitted in the correct spatial registration using the City datum and survey control network based on NAD 1983/1991 Washington State Plane North coordinates. All elevations and grades on construction plans must be to the City of Bothell datum and NAVD 88 Elevations.
4. Depending upon drawing complexity, more than one drawing may be submitted. Unless clearly described by the specific layer name, an index indicating what layer data corresponds to each layer name must also be provided.
5. The following information must be provided on the record drawings:

<b>Roadway or Site Improvements</b>	<b>Traffic Improvements</b>	<b>Water Improvements</b>	<b>Sanitary Sewer Improvements</b>	<b>Stormwater Improvements</b>
Road Centerline	Traffic Signals	Valves (All types)	Manholes (Rim and Invert Elevations)	Catch Basins (Rim and Invert Elevations)
Edge of pavement	Street lights	Meter Boxes	Cleanouts	Cleanouts
Curb ramps	Control Boxes	Fire Hydrants	Valves	Yard Drains
Sidewalks	Channalization	Fire Connections	Lift Stations	Outfalls
Curb and gutter		Pipes(Including Size and Material)	Pipes (Including Size and Material)	Pipes (including Size and Material)
Driveways		Services	Laterals	Bio Retention Systems
Median islands		District Interties	Septic Systems	Culverts
Retaining walls		Reservoirs	Grease Interceptors	Ditches
Bridges		Pump Stations		Wetland and Wetland Buffers
Signs		Special Fittings		Pervious Hardscape
Guardrails		Vaults		Vaults
Right of Way				Trenches
Easements				Tree Boxes
Private Roads				Bio Swales
Survey Monuments				Street Berms
Property Lines				Cisterns
Building Outlines				Detention Ponds
Parking Lots				Streams and Stream Buffers

#### **1-14.2 PUBLIC CONSTRUCTION**

Final acceptance and contractor payment will be withheld until the red-lined drawings have been submitted and approved.

Record drawings must be prepared in accordance with the following:

1. The contractor must supply the City project engineer with red-lined drawings. These drawings must show any and all changes in the final locations of all items of work including, but not limited to: curb and gutter, sidewalks, street lighting, fire hydrants, storm drain lines, water lines, sewer lines, catch basins, manholes, underground oil tanks, septic tanks, fire hydrants, valves, new and existing utilities, abandoned in place utilities, and their appurtenances included in the work. Refer to specific chapters of these Standards for requirements for each type of work.

2. The City project manager will review the Contractor submitted red-lined drawings, include any additional information collected by the City staff, and resolve any differences before creating final record drawings in digital files and accepting the Contractor's red-lined drawings.
3. All final record drawings must be submitted in digital files, on CD-ROM, DVD, OneDrive, or published to a City Public FTP site in one of the following formats:
  - a) AutoCAD (include all reference files, fonts, CTB file, and a layer index describing the data found on each layer.
  - b) ArcGIS .GDB, .MDB or .SHP

In addition to one of the above, digital images of all plan sets must be provided as multi-page PDFs and individual TIFF images (each sheet as a separate image), using the state's requirements for producing digital images for archive purposes. Please see WAC Title 434 Chapter 434-663.

4. All digital files must be drawn and submitted in the correct spatial registration using the City of Bothell datum and survey control network based on NAD 1983/1991 Washington State Plane North coordinates. All elevations and grades on construction plans must be to City of Bothell datum and NAVD 88 Elevations.
5. Depending upon drawing complexity, more than one drawing may be submitted. Unless clearly described by the specific layer name, an index indicating what layer data corresponds to each layer name must also be provided.
6. The following information must be provided on the record drawings:

<b>Roadway or Site Improvements</b>	<b>Traffic Improvements</b>	<b>Water Improvements</b>	<b>Sanitary Sewer Improvements</b>	<b>Stormwater Improvements</b>
Road Centerline	Traffic Signals	Valves (All types)	Manholes (Rim and Invert Elevations)	Catch Basins (Rim and Invert Elevations)
Edge of pavement	Street lights	Meter Boxes	Cleanouts	Cleanouts
Curb ramps	Control Boxes	Fire Hydrants	Valves	Yard Drains
Sidewalks	Channelization	Fire Connections	Lift Stations	Outfalls
Curb and gutter		Pipes(Including Size and Material)	Pipes (Including Size and Material)	Pipes (including Size and Material)
Driveways		Services	Laterals	Bio Retention Systems
Median islands		District Interties	Septic Systems	Culverts
Retaining walls		Reservoirs	Grease Interceptors	Ditches
Bridges		Pump Stations		Wetland and Wetland Buffers
Signs		Special Fittings		Pervious Hardscape
Guardrails		Vaults		Vaults
Right of Way				Trenches
Easements				Tree Boxes
Private Roads				Bio Swales
Survey Monuments				Street Berms
Property Lines				Cisterns
Building Outlines				Detention Ponds
Parking Lots				Streams and Stream Buffers

# Chapter 2

## GRADING AND LAND ALTERATION



City of Bothell™

## DESIGN AND CONSTRUCTION

## STANDARDS AND SPECIFICATIONS 2019

### Sections

#### 2-1 Grading Permit Requirements

2-1.1 Deviation from Design Standards

2-1.2 Variance Request Application Process

## **2-1 GRADING PERMIT REQUIREMENTS**

All grading must comply with Appendix J of the current adopted version of the International Building Code (IBC), as cited in BMC 18.05 and 20. Replace the term “Building Official” in the IBC with “Public Works Director”.

See 1-9 for construction plans requirements and Appendix C for required Standard Notes on Plans.

### **2-1.1 DEVIATIONS FROM BOTHELL STANDARDS**

Permissible alternatives to the grading permit requirements are subject to review and approval or disapproval by the Public Works Director. Permissible alternatives different from these Standards may be approved upon review of evidence submitted by the Developer that such modifications are equal to or better than the requirements in these Standards, that they are in the public interest, that they are based upon sound engineering judgment, and that requirements for safety, function, appearance, and maintainability are fully met. Requests for approval of proposed alternatives should be submitted as soon as possible during the permit process to allow time for a decision by the Director. Requested alternatives must be reviewed and approved prior to construction.

### **2-1.2 VARIANCE REQUEST APPLICATION PROCESS**

Requests for a variance from the BMC will only be accepted for permits pending approval.

The Developer must provide the information required by BMC 11, 17.23, 18.05, and 20 to the Public Works Department to initiate the review process.

# Chapter 3

## STREETS AND RELATED WORK



City of Bothell™

## DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS 2019

### Sections

#### 3-1 General Requirements

#### 3-2 Standards

#### 3-3 Permits

- 3-3.1 Requirements
- 3-3.2 Permit Application
- 3-3.3 Permit Inspection
- 3-3.4 Performance and Maintenance Bonds Required

#### 3-4 Roadway Classification and Geometrics

- 3-4.1 General
- 3-4.2 Horizontal and Vertical Alignment
- 3-4.3 Sight Distance
- 3-4.4 Intersections
- 3-4.5 Curb Return Radii
- 3-4.6 Street Ends
- 3-4.7 Downtown Street Design Standards
- 3-4.8 Transit Amenities

#### 3-5 Transportation Impact Analysis

- 3-5.1 Responsibility and Purpose
- 3-5.2 TIA Contents

#### 3-6 Traffic Control

- 3-6.1 Disruption of traffic
- 3-6.2 Traffic signals Plans and Specs
- 3-6.3 Channelization Plans

#### 3-7 Fire Apparatus Access

#### 3-8 Surveying and Monumentation

- 3-8.1 Description
- 3-8.2 Materials
- 3-8.3 Construction

### **3-9 Street Illumination and Electrical Power**

- 3-9.1 General
- 3-9.2 Snohomish County
- 3-9.3 King county
- 3-9.4 New Construction and Relocation of Existing Facilities
- 3-9.5 Design Standards
- 3-9.6 Downtown Street Network Illumination Standards
- 3-9.7 Downtown Street Network Small Cell Aesthetic, Design, and Concealment Standards

### **3-10 Asphalt, Concrete and Pavement Patching**

- 3-10.1 Description
- 3-10.2 Materials
- 3-10.3 Construction Requirements

### **3-11 Underground Utilities**

- 3-11.1 General
  - 3-11.1.1 Requirement to Underground Utilities Associated with Developments
- 3-11.2 Trench Excavation
- 3-11.3 Trench Backfill
- 3-11.4 Compaction
- 3-11.5 Trenching Longitudinal to Roadway
- 3-11.6 Trenching Transverse to Roadway
- 3-11.7 Jacking, Augering, or Tunneling

### **3-12 Guardrails**

### **3-13 Mailboxes**

### **3-14 Rockeries and Rockwalls**

- 3-14.1 Description
- 3-14.2 General
- 3-14.3 Materials
- 3-14.4 Construction Requirements

### **3-15 Pedestrian Hand Railings and Guardrails**

- 3-15.1 Description
- 3-15.2 Materials
- 3-15.3 Fabrication
- 3-15.4 Installation

### **3-16 Cement Concrete Sidewalks**

- 3-16.1 Description
- 3-16.2 Materials
- 3-16.3 Construction Requirements



<b>3-17</b>	<b>Curb and Gutter Sections</b>
3-17.1	Description
3-17.2	Materials
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3-18.2	Materials
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<b>3-20</b>	<b>Parking</b>
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3-20.2	Construction
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<b>3-21</b>	<b>Landscaping</b>
3-21.1	Purpose
3-21.2	Implementation
3-21.3	Adopted Plant Lists
3-21.4	Wetland Plants

## 3-1 GENERAL REQUIREMENTS

All work performed in the design, preparation of plans, and construction or improvement of all streets and appurtenances, whether public or private, is the responsibility of the Developer and must be completed to the satisfaction of the Public Works Director in accordance with these standards.

It is emphasized that no permits will be issued to start work until plans for the work are approved and the necessary bonds have been provided.

Any revisions to the approved development plans must be submitted to and approved by the Public Works Director, before being implemented. A set of as-built drawings must be submitted at the completion of the project. Final acceptance of the work is be conditioned on approval of as-built drawings. See individual utility sections of the Bothell Standards for more specific as-built requirements.

The BMC and the Bothell Standards establish requirements for the installation of street improvements. Permit applications may be reviewed at a scheduled pre-application conference with the Developer or at the time of permit application submittal and/or issuance.

See 1-9 for construction plans requirements and Appendix C for required Standard Notes on Plans.

## **3-2 STANDARDS**

All work and materials must be in accordance with the latest editions of the Bothell Standards and the WSDOT/APWA Standard Specifications. See BMC 17.02 for process for requesting deviations from Bothell Standards.

## **3-3 PERMITS**

### **3-3.1 REQUIREMENTS**

It is unlawful for any person to dig up, break, excavate, tunnel, or undermine, any street for any purpose, or to place excavated material obstructing the free use of the street, unless such person has first obtained the necessary permit(s).

### **3-3.2 PERMIT APPLICATION**

No permit will be issued unless a written permit application is submitted to and approved by the Community Development Department and the Public Works Department. The permit application must be accompanied by the required plans, details, calculations, specifications, and estimates, as established by the Public Works Department. The Developer may contact the Permit Services Division of the Community Development Department and request a list of submittal requirements prior to applying for any permit.

### **3-3.3 PERMIT INSPECTION**

The Developer must produce their permit upon request by a City official at the site of the permitted work. It is unlawful to exhibit a permit at or about any project not covered by such permit, or to misrepresent the number of the permit or the date of expiration of the permit.

## 3-4 ROADWAY CLASSIFICATION AND GEOMETRICS

### 3-4.1 GENERAL

#### 3-4.1.1 Road Classifications

1. Roadway functional classifications are shown in Figure TR 2 of the Imagine Bothell...Comprehensive Plan, further described in each subarea plan, and in Standard Detail 300. Downtown street types are further described in the 2009 Downtown Subarea Plan & Regulations. Criteria for minimum right-of-way, roadway widths, and other geometrics are listed for each downtown street type. Additional right-of-way and traffic lanes may be required to accommodate turning movements at intersections and parking, as determined by a traffic impact analysis for a proposed project.
2. The minimum structural sections and roadway appurtenances are to be as shown on Standard Details 301 through 311 and 317 and 320. The Public Works Director may require the final lift of asphalt to be bonded and delayed for up to one year, due to weather and other considerations, whichever is greater. A geotechnical study including recommendations will be required for any proposed new road construction, widening of existing roadways, or major repair and overlay work to verify structural section requirements. The Developer must submit such reports, prepared by a professional engineer licensed in the state of Washington, for review by the Public Works Director. Modifications to the minimum road structural sections may be required to address site specific soil conditions, drainage considerations, and vehicle loads. Where transit or truck traffic is anticipated, the Developer's traffic and geotechnical engineers should evaluate the adequacy of the proposal and recommend additional specific measures to ensure a minimum 20-year design life for the new asphalt pavement section. A minimum 40-year design life is to be used for concrete pavement sections.

#### 3-4.1.2 Right-Of-Way and Easements

1. Deeded or dedicated right-of-way is required for all public roadway improvements. All portions of the traveled way, curbs, gutters, sidewalks, medians, bike lanes, drainage facilities, traffic signal system components, and other required improvements must be located within the right-of-way.
2. Where existing right-of-way width is not sufficient to construct the required improvements, the Developer must obtain and dedicate to the City the necessary additional right-of-way. Dedications must conform to BMC 17.
3. Easements for construction, access, maintenance, sight distance preservation, roadway slopes, utilities, and storm drain installation may be required, in addition to required right-of-way, in conjunction with roadway improvements. See 1-9 for easement requirements. Street landscaping, as required, must be included in the easements. The Developer must obtain necessary easements and provide recorded copies of such easements to the City.
4. When off-site or on-site easements for the extension of approved, comprehensive streets are required, the easements must be approved and recorded prior to the start of construction.

5. The access into a residential short plat must be at least 20 unobstructed feet wide. Paved access to two lots must be at least 16 feet wide. Paved access serving three or more residential lots must be at least 20 feet wide.

#### **3-4.1.3 Bike Lanes**

Bikeways are generally shared with other transportation modes, although they may be provided exclusively for bicycle use. Bikeways are categorized below, based on degree of separation from motor vehicles and other transportation modes.

Shared use path means a path or way which is physically separated from motorized vehicular traffic by an open space or barrier and is either within the highway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users. Shared use paths are 12 feet wide.

Bicycle lane means a portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes are 5 feet wide on a curbed road and a minimum of 5 feet wide as a shoulder bike lane.

Additional requirements and locations for bike lanes are established in the Imagine Bothell... Comprehensive Plan and as indicated on Standard Details 305 to 309. Exact locations of bike lanes with respect to sidewalks and road lanes will be determined on a project specific basis. The transportation engineer will determine final locations, widths, and related requirements. If the required bike lane will not fit within the existing right-of-way available, then the Developer must obtain, at their cost, and dedicate to the City the additional right-of-way and easements necessary. All bicycle facilities must conform to AASHTO Standards for bike lanes, trails, and paths.

#### **3-4.1.4 Utilities**

Public utilities locations in a typical roadway are shown on Standard Detail 304. Deviations from the typical locations may be approved, subject to review of information submitted to the City by the Developer's engineer. For storm drainage, water, and sanitary sewer design and construction considerations, refer to Bothell Standards Chapters 4, 5, and 6, respectively. Prior to design and construction, the Developer must survey underground utilities, mark their location on the ground, and show them on the project design drawings. The Developer must also research available utilities information for use during the design, permit, and construction process.

#### **3-4.1.5 Private Streets**

A private street will not be allowed, except in unusual circumstances where specifically approved by the Community Development Director, Fire Marshall, and Public Works Director. To obtain approval, proposed private streets must satisfy all of the following requirements:

1. Is located in an established tract providing legal access to each affected lot, sufficient to accommodate the required improvements; and

2. Is located in a development where future road extension or half-road access to adjacent properties and/or existing or proposed streets is not feasible because of environmental constraints or full build-out of adjacent parcels; and
3. Is a Local Access Street built to the Bothell Standards for road width, parking, pedestrian access, and pavement thickness; and
4. Is less than 150 feet long as measured from the curbline of a public road or, if longer than 150 feet, terminates in an approved turn-around and is accessible at all times for emergency and public service vehicle use; and
5. Does not conflict with the goals of the Imagine Bothell Comprehensive Plan or the Capital Facilities Plan; and
6. Does not result in land locking of present or future parcels; and
7. Is not needed as public roads to meet the minimum road spacing requirements of the Imagine Bothell...Comprehensive Plan and the Bothell Standards; and
8. Is maintained by an owner or homeowners association or other legal entity made up of all benefited property owners, as noted on the face of the plat; and
9. Is clearly described on the face of the plat, and clearly signed at street location as a private street, not maintained by the City of Bothell.

### **3-4.2 HORIZONTAL AND VERTICAL ALIGNMENT**

Alignment of roadways, both horizontally and vertically, must be in conformance with the guidelines of the American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets and the WSDOT Design Manual. The Public Works Director reserves the right to determine final project geometric requirements. All new frontage improvements or other street improvements, whether public or private, must conform to the AASHTO minimum design geometrics for safe stopping and entering sight distance, consistent with the procedure described in the AASHTO Policy and the Bothell Standards, unless otherwise approved by the Public Works Director.

#### **3-4.2.1 Street Layout**

Design considerations for street layout in new developments are found in the Imagine Bothell...Comprehensive Plan, BMC 12, the Downtown Subarea Plan & Regulations, and include the following:

1. Provide for the continuation or appropriate projection of existing streets in surrounding areas. This includes, but is not limited to, new/completed street linkages compatible with an overall city circulation network to provide improved connectivity of the street system, half-street improvements to provide access to adjacent developable or re-developable properties to minimize intersection spacing, and temporary road terminations to provide future extension to adjacent developable or re-developable properties. Or, conform to a plan for the neighborhood approved by the Public Works Director to meet a particular situation where topography or other conditions make continuance to existing streets impracticable.
2. Where a subdivision abuts or contains an existing or proposed arterial street, the Public Works Director may require marginal access streets, reverse frontage lots with screen planting contained in a non-access reservation along the rear property line, deep lots with rear service alleys, or such other treatment as may be necessary

for adequate protection of residential properties and to afford separation of through and local traffic.

3. A tangent must be introduced between reverse curves. The tangent must be at least 100 feet long for arterial and collector streets, and 50 feet long for residential access streets.
4. Street intersections with centerline offsets of less than 300 feet for arterials and collectors and 150 feet for residential access streets must be avoided or approved by the Public Works Director.
5. Streets must intersect at right angles, plus or minus 5 degrees, measured at 10 feet beyond the road classification right-of-way, unless otherwise approved by the Public Works Director.
6. Property lines at street intersections must be rounded with a radius of 10 feet. The Public Works Director may deem it necessary to require a radius greater than 10 feet. The Public Works Director may permit comparable cutoffs or chords in place of rounded corners.
7. Curb extensions (bulb-outs) must be utilized on Local Streets to minimize pedestrian crossing distance at intersections to the minimum travel way width and clearly delineate on-street parking.
8. Street right-of-way widths must be as shown in Standard Detail 300. A wider right-of-way may be required to accommodate bicycle facilities, additional travel lanes, or other needs as determined by the traffic analysis and approved by the City.
9. The use of shared driveways is encouraged on arterials to minimize the number of access points.
10. Commercial and multifamily driveway centerline offsets must align with any opposing driveways or be offset by no less than 125 feet, unless otherwise approved by the Public Works Director. Driveways must be separated by 125 feet where possible.
11. Driveway access directly onto arterials may be denied, if an alternate access is available.
12. Provide access to adjoining, undeveloped property where determined by the Public Works Director.
13. Where more than 49 units are designed in a residential development, either single family, multifamily, retirement, or similar, there must be a minimum of two access points to the street system. Such access points must be located to provide circulation, alternate emergency vehicle access routes, through access, and general area transportation design considerations.
14. Street grade must not exceed 15 percent. The Public Works Director may approve up to an additional 3 percent grade on a project by project basis. Gutter cross-slope must be no less than 0.50 percent.



#### **3.4.2.2 Half Streets**

1. A half street may be permitted as an interim Local Access street facility when:
  - a) Such street must not serve as primary access to more than 49 dwelling units or tax lots; and
  - b) Such alignment is consistent with or will establish a reasonable circulation pattern; and
  - c) There is reasonable assurance of obtaining the prescribed additional right-of-way from the adjoining property with topography suitable for completion of a full-section road.
2. A half street must meet the following requirements:
  - a) Right-of-way width of the half street must equal at least 32 feet and encompass all required improvements; and
  - b) If feasible, the half street must be graded consistent with the centerline of the ultimate road section on the property line; and
  - c) The traveled way must be surfaced the same as the designated road type to a width not less than 20 feet (28 feet with parking lane); the sidewalk and landscape must be constructed as required for the designated road type; and
  - d) The property line edge of the street must be finished with temporary curbing, shoulders, ditches, and/or side slopes so as to ensure proper drainage.
  - e) Bank stability and traffic safety must be placed on the unfinished side of the street; and
  - f) Half streets must not intersect other half streets unless approved by the Public Works Director.
3. When a half street is eventually completed to a whole street, the completing builder must reconstruct the original half street as necessary to produce a proper full-width street.
4. The Developer must obtain any right-of-way or easements needed to accomplish the above.
5. See Standard Detail 303 for further explanation.

#### **3-4.2.3 Alleys**

1. The width of an alley is as indicated in the Bothell Standard Detail 311.
2. Alley intersections and sharp changes in alignment must be avoided, but where necessary, corners must be cut off sufficiently to permit safe vehicular movement.
3. Dead-end alleys must be avoided where possible, but if unavoidable, dead-end alleys must have adequate turnaround facilities at the dead end, as determined by the Public Works Director and Fire Marshall.

#### **3-4.2.4 Blocks**

1. Block length must not exceed 1,320 feet and must not be less than 500 feet. Modification of these requirements by the Public Works Director may be necessary in cases of extreme topography and in multifamily residential, commercial, and industrial developments.
2. Cross-block lengths must not be less than 200 feet to allow two rows of lots with an alley or utility easement, except that the Public Works Director may approve a single row of lots where the lots abut a major arterial or collector street, a drainage course, a railroad right-of-way, or a single row of lots in an abutting subdivision of record.
3. Where blocks are longer than 660 feet, and where access to a school, park, or shopping is considered necessary, the Public Works Director may require a pedestrian walkway, approximately mid-block, with a minimum right-of-way width of 10 feet, with such surfacing, fencing, and barriers as deemed necessary.
4. Cul-de-sacs may require cross-connecting pedestrian/bicycle paths to adjoining streets, as determined by the Public Works Director.

#### **3-4.2.5 Lots**

1. Depth, width, area, and shape of lots for commercial or industrial purposes must be sufficient to accommodate off-street service and parking facilities in accordance with BMC 12.
2. Double frontage lots will access only one street, except that the Public Works Director may approve dual access for lots where it is essential to provide separation of residential development from a major traffic arterial or to overcome specific disadvantages of topography. A 20-foot buffer easement with appropriate screening must be provided along lot lines abutting such principal, minor, or collector arterials, or disadvantageous use, such as a railroad, and there must be no right of vehicular access across the buffer easement. All private driveways serving more than one lot must be in a private tract, unless otherwise approved by the Public Works Director.
3. When the rear or side of any lot borders a freeway, highway, or parkway, the Developer may be required to dedicate and improve a planting strip adjacent to the thoroughfare.
4. Each lot created by a long plat must abut an existing or proposed dedicated street, or Private Street in accordance with 3-4.15, in such manner as to provide an adequate building area with the exception that combined private driveway access for more than one parcel may be approved with the contingency that the driveway is jointly owned and maintained, and that covenants, as approved by the City, are established to provide for this maintenance in perpetuity.
5. No lot may be created which is divided by county, city, school, or other taxing district boundary line.

### 3-4.2.6 Driveways

The Public Works Director has the authority to restrict the number, size, and location of access driveways. In critical on-street parking areas, additional off-street parking space(s) are required to replace the on-street spaces eliminated by any driveways.

No driveway approach will be permitted to encompass any infrastructure, such as hydrants, meters, blow-offs, pump stations, etc. Permit conditions may authorize the Developer to relocate such infrastructure, including any within the limits of a curb return, which may be encroached upon as allowed.

1. At intersections, no portion of any driveway approach, including end slopes, will be permitted closer than 4 feet to the end of the curb return. Residential Driveways/Approaches must comply with the following
  - a) A driveway approach is defined as the area between full sections of a street's vertical curb that are lowered to allow vehicular access into the property. Each single ownership will be entitled to a 16-foot driveway approach.
  - b) Where a driveway approach in excess of 16 feet is requested for a single ownership, the maximum approaches are as follows:

Frontage	MAXIMUM DRIVEWAY APPROACH	
	One Driveway	Two Driveways
Under 40 feet	16 feet	NA
40 to 60 feet	20 feet	NA
Over 60 feet but not exceeding 100 feet	25 feet	20 feet each.

- i) A safety island of not less than 20 feet of full height curb must in all cases be provided between driveway approaches under one ownership or where practicable under separate ownership. On any frontage in excess of 100 feet, each 100 feet or fraction thereof is considered under separate ownership.
- ii) Any driveway approach in excess of the maximums set forth in this subsection must receive the approval of the Public Works Director.
- iii) In no event may the driveway approach, including end slopes, extend beyond a line perpendicular to the curbline at the owner's property corner.
- iv) In cases where a driveway approach is constructed on a corner lot, no curb cut may be constructed closer than 4 feet from the end of the curb return at the curbline.
- v) Driveway approaches located within 5 feet of the existing curb return at an alley intersection may be merged with the alley intersection pavement, thus requiring removal of the existing curb return. The total apron length

plus the alley width, measured at the curbline of the apron to the opposite alley line must not exceed 40 feet.

- vi) Grade: The maximum allowable grade is 15 percent. Vertical curves must be used for smooth transitions at significant grade differentials.

2. Areas of Limited Street Improvements.

- a) Where standard gutters and curbs have been installed, but concrete sidewalks have not, the permit may authorize the Developer to construct the driveway approach, from the curbline to the subject property, of the same materials used for paving the subject property. Such driveway approach must be constructed to approve grade and must be adequate and suitable for the traffic to be carried by it. The permit will require that, if and when thereafter concrete sidewalks are constructed, the Developer or their successor must obtain a right-of-way permit and install concrete driveway approaches.
- b) Where standard gutters and curbs have not been installed, the apron length must be measured along the property line and there must be not less than 20 feet of frontage between driveway approaches serving any one property. Permits will not be issued for any surface improvement or paving on the street right-of-way between driveway approaches unless a concrete curb or other physical obstruction of a design satisfactory to the Public Works Director is constructed and maintained by the owner along their property line so that the entrance and exit of vehicles to and from the owner's property will be restricted to the established driveway approaches. Pursuant to the permit conditions, the Developer may surface the driveway approaches or other areas within the right-of-way, extending the same type paving used on the subject property so that it merges with the street pavement; provided the paving is adequate and suitable for the traffic to be carried. Such extended paving between the property line and the street pavement must be to established grade or other slope, as designed by the Developer's engineer and approved by the Public Works Director, to provide for proper runoff.
- c) Such paving between the property line and the street pavement may meet the street pavement at a point ahead of the curb opening in order to provide for safe deceleration of vehicles turning into the driveway. If the project paving is extended beyond the property line into a street right-of-way at an intersection or crossroad, the Director may require the Developer to construct a suitable traffic island or curb to protect municipal facilities, as may be necessary.
- d) Approaches - Encroachment on public property is prohibited. City street rights-of-way may not be used for private residential or commercial purposes. A permit for the construction of driveway approaches will not be issued unless vehicles to be served or serviced can be parked entirely within the private property lines.

- 3. Driveways accessing any arterial (including collectors) and serving more than 10 vehicle trips in any given hour may be required to align at all times with opposing driveways or be offset by a minimum of 125 feet. Restrictions on the access of a development may be imposed by the Public Works Director if the development is likely to exacerbate or create potential safety hazards as a result of the development.

4. The use of shared driveways is highly encouraged to minimize the number of access points on arterials and collector streets.
5. Driveways giving access directly onto arterials may be denied if alternate access is available.
6. Commercial Driveways

When allowed, driveways located closer than 100 feet from the approach to an arterial intersection may require medians, Type C curbs, and/or signing to restrict access to safe movements only as determined by the Public Works Director.

Commercial Driveway	
MPH Speed Posted	Maximum Width
30 or less	25
35 to 40	30
Over 40	35

See ① on Standard Details 346 and 347.

Grade: The maximum grade of 15 percent may be allowed. Steeper grades are subject to the approval of the Fire Marshall and Public Works Director. Vertical curves must be used for smooth transitions at significant grade differentials.

7. Intersection Type Driveways

Private intersection type driveway openings will be considered in lieu of conventional driveways in commercial areas if all the criteria below are met. However, meeting the criteria does not guarantee that an intersection type driveway will be allowed.

- a) Projected driveway usage is greater than 1,000 vehicles per day.
- b) The opening is at least 160 feet from any other intersection.
- c) The opening is at least 160 feet from any other driveway on the property frontage under control of the Developer.
- d) A minimum 100 feet throat length is provided between the curbline on the street and any area required for turning or parking maneuvers within the development.
- e) If a driveway intersects with state route right-of-way, the Developer must also coordinate with WSDOT.

8. Throat Length Requirements

The throat length is the unobstructed area measured from the inside face of curb to the first driveway or parking stall. The minimum throat length must be 25 feet for all land uses, unless the Public Works Director determines, in specific cases, during development review, that greater throat length is required. Throat lengths for collectors and minor and principal arterials will be at least 50 feet to accommodate higher driving speeds and traffic site distance requirements. The

throat length may be reduced for multiple driveways, as approved by the Public Works Director.

#### **3-4.2.7 Local Access Streets**

Local Access Streets must be designed in accordance with Standard Details 300 and 310. Reduced roadway improvements for Local Access Streets may be allowed when specifically approved by the Community Development Director, Fire Marshall, and Public Works Director. Reduced Local Access Street improvements will only be approved where they now, and in the future, serve 49 or fewer lots including existing lots, new lots, and lots associated with future roadway extension or half-road completion. Local Access Streets reductions will be reviewed on a case-by-case basis and may include consideration of sensitive area constraints, existing and future planned motorized and non-motorized improvements, roadway intersection and driveway spacing, the type and density of development, and other physical and development factors. The following Local Access Streets reductions may be considered:

1. Sidewalk along curbline adjacent to on-street parking lane with compensatory 5-foot wide landscape easement including street trees located behind the sidewalk and maintained by the adjacent property owner or Owners Association as documented in the final plat or other legal instrument, located behind the sidewalk and outside of right-of-way.
2. Deletion of the on-street parking lane, and associated decrease in roadway width to minimum 20-foot wide continuous drivable fire lane, where edge-to-edge driveway spacing along the curbline of less than 15 feet precludes on-street parking. Compensatory parking, at a minimum of 1 stall for each 5 residential units must be provided in dedicated parking areas elsewhere within the development.
3. For development serving fewer than 25 lots including existing lots, new lots, and lots associated with future roadway extension or half-road completion: Sidewalk along curbline on both sides of the roadway with compensatory 5-foot wide landscape easement including street trees behind the sidewalk maintained by the adjacent property owner or Owners Association as documented in the final plat or other legal instrument, located behind the sidewalk and outside of right-of-way.

#### **3-4.2.8 Private Access Tracts**

Private Access Tracts are privately owned and maintained tracts that conform to the following criteria:

1. Maximum tract length of 150 feet measured from the nearest intersecting street curbline to the furthest extent of paved tract.
2. Direct access to a vehicular access tract or road frontage required for each unit.
3. Designated 1 visitor parking spaces for each 5 residential units per dwelling unit within dedicate parking lane along the access tract, or other dedicated parking locations within the tract, unless otherwise approved by the Public Works and Community Development Directors.
4. For up to two units: Tracts must be completed in accordance with 3-4.2.6
5. For three or more units: The total number of residential units accessed at each tract will be limited to a maximum of four for R 8,400 and R 9,600, six for R 5,400d and R 7,200, eight for R 4,000 and R 5,000a, and 10 for R 2,800. Private access tracts must:

- a) Provide sufficient driveway length, or tract and pavement width, to allow the required designated 0.2 visitor parking spaces per dwelling unit.
- b) For Tracts with a parking lane: Minimum tract width of 30 feet, travelway pavement width of 20 feet, and 8-foot wide curb-delineated parking lane with opposite side posted “No Parking Fire Lane”.
- c) For Tracts without a parking lane: Minimum tract width of 22 feet with a pavement width of 20 feet posted both sides “No Parking Fire Lane”.
- d) Access tract must be surfaced with a 4- inch thickness of HMA with curblane drainage, or 6- inch thickness of portland cement concrete with standard or inverted crown, on a minimum 6- inch thickness of compacted crushed rock base over suitable firm and unyielding subgrade. Alternatively, access tract may be surfaced with permeable pavers or pavements systems with approval by the Community Development and Public Works Directors.
- e) Access tract pavement must include an at-grade, 4-foot wide walk path surfaced with portland cement concrete within, and along the edge, of the access tract surface.
- f) Overall on-site and off-site connectivity, safety, and slope requirements are provided.

### 3-4.3 SIGHT DISTANCE

Providing adequate sight distance from a street or driveway is one of the most important considerations in ensuring a safe street and driveway operation. The following sight clearance requirements take into account the proportional relationship between speed and stopping/entering sight distance.

Intersection sight distances must be evaluated based upon the values noted on Standard Detail 337 for Sight Distance setback lines at controlled intersections. Sight distance requirements for each approach must be based upon the posted speed of the cross street. For uncontrolled and yield intersections along 25 mph local streets, the sight distance must be evaluated based upon the values noted in Standard Detail 338. For pedestrian-only corridors intersecting a roadway, the sight distance must be evaluated based upon the values noted in Standard Detail 339. The Public Works Director may require that current AASHTO Policy on Geometric Design be followed.

Vertical curves on City streets with stopping sight distance less than that required to meet current **AASHTO Policy on Geometric Design** may be approved by the Public Works Director, if no practical design exists, and if acceptable road lighting, maintained by a franchised utility, is provided throughout the curve.

Standard Details 337, 338, and 339 show the sight distance triangle. The area within this triangle will be subject to restrictions as necessary to maintain a clear view on the intersection approaches. Driveways will also be subject to sight distance triangle restrictions, including landscaping and placement of view obstructions, and landscape medians or islands. Other factors, such as vertical and horizontal curves and roadway grades, need to be taken into account. Such factors may necessitate a modification to the intersection sight distance requirements.

The vertical clearance area within the sight distance triangle must be free from obstructions to a motor vehicle operator’s view. See Standard Detail 337.

#### **3-4.4 INTERSECTIONS**

Every intersection must be designed to accommodate the design vehicle appropriate for the highest classified street forming the intersection. Design vehicle must be SU for residential streets, and WB-40 for commercial area roadways. When the intersection is along a transit or school bus route, BUS design vehicle must be used as a minimum. If an intersection is utilized frequently by large vehicles, WB-50 may be used for design vehicle. All elements of the intersection, including turning lanes and channelizing islands, must be designed so that a design vehicle will not encroach onto curbs, sidewalks, traffic control devices, channelizing islands, or center divisional medians, or encroach into the travel lanes of opposing flow traffic.

#### **3-4.5 CURB RETURN RADIUS**

Intersection turning radius is determined primarily by the designated functional classification of intersecting roadways. These turning radii are shown on Standard Detail 355.

Where high concentrations of pedestrians (i.e., the downtown business core) would warrant a lesser radius, The Public Works Director may approve a reduced radius to minimize pedestrian crossing length so long as the turn movement is not subject to a high degree of large truck/bus movements.

Auto turn diagram may be required to verify the adequacy of turning radii.

#### **3-4.6 STREET ENDS**

Cul-de-sacs must be provided at all permanent street ends, and/or on any dead end locations when the length of the street is more than 350 feet. Cul-de-sacs must be designed per Standard Detail 320. Permanent street ends may not exceed 450 feet in length, unless written approval is granted by the Fire Marshall and Public Works Director.

All roadways greater than 150 feet in length and serving three or more residences require an approved turnaround. A hammerhead turnaround, per Standard Detail 320, may be utilized on private streets or access tract between 150 feet and 350 in length and serving three or more residences instead of a Cul-de-sac upon written approval from the Fire Marshall and Public Works Director. Private access roads and tracts serving one or two lots do not require a turnaround.

#### **3-4.7 DOWNTOWN STREETS**

##### **Street Design (Street Types)**

New Street Types must be designed as described in the following Street Design Sections. The street types permitted in a given District must be as specified in BMC 12.64.100 District Requirements. Developer may propose modifications to the Street Designs, provided that it can be shown that the modified street design satisfies or enhances the streetscape environment regarding each of the following stated purposes.

New streets within the downtown subarea must be designed as bicycle friendly. Some streets may be designated for formal bike lanes, some streets may be designated as preferred bike routes, while other streets may be designated for shared bike/auto use by using pavement markings such as "sharrows." Bike lanes will not be required on the 185th Street – 98th Avenue Connector.



New streets within the downtown subarea must be designed as “Complete Streets” with all users in mind including motorists, pedestrians, bicycles, and commercial and service users. Streets must be designed to provide ADA accessibility including dedicated ADA parking stalls and associated improvements within the Downtown Commercial District and Civic Facilities.

## **1. City Street**

- a) Purpose: Organize the primary public realm to create an environment suitable for shopping and strolling along active retail, eating, and entertainment uses. Core Street sidewalks should be wide and unobstructed to provide ample room for pedestrians to walk, and to encourage activities including outdoor dining, locations for kiosks, food carts, and flower stalls.
- b) Components
  - i) On-street parking oriented parallel or at a 45-degree angle to the curb.
  - ii) Each block must have a single species of large, open-habit deciduous trees with a maximum spacing of 40 feet on-center. Trees should be located in tree grates that are flush mounted at the back of curb, or in continuous planting strips a minimum of 6 feet wide located along the back of curb.
    - Trees should be maintained in a way that provides unobstructed views to showroom windows and building signage.
    - Trees must be spaced to allow Fire Department access to roof structures with aerial ladders.
  - iii) Pedestrian-scale decorative street lighting in the sidewalk with a maximum spacing of 80 feet on-center. The light source should be located 12 to 14 feet above finished grade.
  - iv) Streetlights should be centered between street trees and otherwise located to avoid conflicts with tree canopies.

The City Street is shown on Standard Detail D-301.

## **2. Neighborhood Avenue**

- a) Purpose: Provide an attractive street to serve as a primary travel corridor within and between neighborhood districts. The Neighborhood Avenue is intended first and foremost to serve residential development and should provide a desirable setting for homes.
- b) Components
  - i) On-street parking, oriented parallel to the curb.
  - ii) Each block must have a single species of large, open-habit deciduous trees with maximum spacing of 40 feet on-center. Trees should be located in continuous planting strips, a minimum of 5 feet wide, located along the back of curb.
    - Trees must be spaced to allow Fire Department access to roof structures with aerial ladders.
  - iii) Trees may be located in curbed planting wells or flush tree grates centered in parking lanes.

- Where trees are located in parking lanes, trees within the planting strips should be staggered between the trees in parking lanes. (Allowed with an approved maintenance plan.)
- Trees in parking lanes must be located a maximum of every two parking spaces or 48 feet on-center.
- iv) Low-lying ground covers and shrubs may be located within the planting strips and planted medians.
- v) Pedestrian-scale decorative street lighting must be provided within the sidewalk at a maximum spacing of 80 feet on-center. The light source should be located 12 to 14 feet above finished grade.
  - Streetlights should be centered between street trees and otherwise located to avoid conflicts with tree canopies.

The Neighborhood Avenue is shown on Standard Detail D-302.

### 3. **Neighborhood Green Street**

- a) Purpose: Provide a centrally-located open space for public gatherings, surrounded by a streetscape environment that enhances the value of its surroundings.
- b) Components
  - i) On-street parking, oriented parallel to the curb.
  - ii) Large, open-habit deciduous trees in planting strips with trees planted with a maximum spacing of 40 feet on-center. Trees should be located in continuous planting strips a minimum of 5 feet wide located along the back of curb.
    - Trees must be spaced to allow Fire Department access to roof structures with aerial ladders.
  - iii) Low-lying ground covers and shrubs may be located within the planting strips.
  - iv) Pedestrian-scale decorative street lighting within the sidewalk and neighborhood green with a maximum spacing of 80 feet on-center. Light source should be located 12 to 14 feet above finished grade.
    - Streetlights should be centered between street trees and otherwise located to avoid conflicts with tree canopies.
  - v) A Neighborhood Green open space composed primarily of grassy open space and including public seating. See BMC 12.64.304 for Open Space Provision regulations.

The Neighborhood Green Street is shown on Standard Detail D-303.

### 1. **Neighborhood Street**

- a) Purpose: Provide an intimate street for internal circulation within a residential neighborhood. The Neighborhood Street is intended as a narrow street to ensure slow moving vehicular traffic and create a livable environment.
- b) Components
  - i) On-street parking, oriented parallel to the curb.

- ii) Each block must have a single species of large, open-habit deciduous trees with maximum spacing of 30 feet on-center. Trees should be located in continuous planting strips a minimum of 6 feet wide located along the back of curb.
  - Trees must be spaced to allow Fire Department access to roof structures with aerial ladders.
- iii) Trees may be located in curbed planting wells or flush grates centered in parking lanes.
  - Where trees are located in parking lanes, trees within the planting strips should be staggered between the trees in parking lanes. (Allowed with an approved maintenance plan)
  - Trees in parking lanes must be located a maximum of every two parking spaces or 48 feet on-center.
- iv) Low-lying ground covers and shrubs may be located within the planting strips.
- v) Pedestrian-scale decorative street lighting must be provided within the sidewalk at a maximum spacing of 90 feet on-center. Light source should be located 12 to 14 feet above finished grade.
  - Streetlights should be centered between street trees and otherwise located to avoid conflicts with tree canopies.

The Neighborhood Street is shown on Standard Detail D-304.

## **2. NE 185th Street/98th Avenue NE Connector**

- a) Purpose: Provide an attractive, urban street to serve as a primary transit corridor. This extension and re-alignment is intended to serve mixed-use development and should provide a desirable setting for development.
- b) Components
  - i) On-street parking, oriented parallel to the curb.
  - ii) Each block must have a single species of large, open-habit deciduous trees with a maximum spacing of 40 feet on-center. Trees should be located in tree grates that are flush mounted at the back of curb.
    - Trees must be spaced to allow Fire Department access to roof structures with aerial ladders.
  - iii) Pedestrian-scale decorative street lighting must be provided within the sidewalk with a maximum spacing of 80 feet on-center. Light source should be located 12 to 14 feet above finished grade.
    - Streetlights should be centered between street trees and otherwise located to avoid conflicts with tree canopies.
  - i) An optional 10-foot minimum wide planted, center median may be provided. This median can be narrowed approaching major intersections to accommodate left turn lanes.
  - ii) Transit amenities, including stop locations with shelters and electronic on-time schedule devices, should be designed into the street.

## **3. Alley**

- a) Purpose: New Alleys may be constructed to provide vehicular and pedestrian access to rear yard garages, carriage homes, and service areas.
- b) Components

- i) Alley right-of-way must be a minimum of 20 feet.
- ii) The Alley must be entirely paved.
- iii) Streetlights compatible with those required on Neighborhood Streets must be provided at a maximum spacing of 100 feet. Lighting fixtures may be freestanding, if placed outside alley right-of-way, or may be attached to garages or other structures.

#### **4. Passage**

- a) Purpose: New Passages may be constructed to provide a pedestrian connection between frontage area and rear residential garages, carriage homes, service areas, and trails.
- b) Components
  - i) Passage right-of-way width must be a minimum of 20 feet. The right-of-way must consist of a pedestrian walkway a minimum of 6 feet wide and continuous planting areas on both sides of the walkway.
  - ii) Streetlights compatible with those required on Neighborhood Streets must be provided at a maximum spacing of 100 feet.
  - iii) Fenced Edge, Terraced Edge, or Flush Edge must be constructed at the edge of a Passage.
  - iv) Passage setback is defined as the required distance from the passage right-of-way to the primary building. The minimum required setback will be 5 feet.

#### **5. Pedestrian Walkway**

- a) Purpose: New Pedestrian Walkways must be constructed to provide a pedestrian connection between SR 522 and the Park at Bothell Landing.
- b) Components
  - i) Pedestrian walkway right-of-way widths must be a minimum of 15 feet. The right-of-way must consist of a paved pedestrian walkway. A linear green may be incorporated in the middle of the pedestrian walkway; in such a case, a paved pedestrian walkway must be provided on each side of the linear green and each walkway must have a minimum width of 7.5 feet.
  - ii) Streetlights compatible with those required on City Streets must be provided at a maximum spacing of 60 feet. Lighting fixtures may be freestanding or may be attached to buildings.
  - iii) Pedestrian Walkway setback is defined as the required distance for the pedestrian walkway right-of-way to the primary building.

### **3-4.8 TRANSIT AMENITIES**

If a project is conditioned to widen or reconstruct a roadway section designated as either a collector or an arterial in the city, an in-line bus stop or pullout must be constructed using concrete pavement. At such locations, a concrete pad for a bus shelter must be provided. Design of the concrete bus stops, bus pullouts, and bus shelter pads require the Public Works Director's review and approval.

### **3-4.9 SERVICE AMENITIES**

Private amenities associated with development and redevelopment adjacent to Downtown Streets must be located outside of right-of-way. Such amenities include, but are not limited to, load & unload zones, garbage and recycling collection, mail and delivery locations associated with the development. These and other amenities, directly associated with the development, will only be allowed within public

right-of-way when approved in writing by the Community Development and Public Works Directors. Adequate vertical, horizontal clearance and circulatory/ turnaround area must be provided for these amenities when they are located within covered parking areas, parking garages, or other locations with limited clearance.

## 3-5 TRAFFIC IMPACT ANALYSIS

### 3-5.1 RESPONSIBILITY AND PURPOSE

BMC 17.04.010 requires Developers to submit a Traffic Impact Analysis (TIA) for any development activity adding 10 or more vehicle trips to a corridor during the peak hour. Such analysis must be prepared by a professional engineer, registered in the state of Washington, with experience in traffic engineering and/or transportation planning.

The extent of the analysis will be determined at the pre-application conference for the project and must be consistent with Public Works Department policies and procedures for the preparation of such analyses. Scoping the requirements for the analysis is intended to identify key issues early in the project planning and development stage, and assist the City during the review and approval process. The City will prepare a checklist documenting the requirements for the analysis. Three copies of the TIA must be submitted with the permit application, together with a concurrency application, and other completed forms as required by the Public Works Department application procedures. The Developer will be notified if additional copies are needed. A copy of the completed checklist must also be submitted with the application. Studies submitted without the completed application material will be considered incomplete, requiring a resubmittal.

Transportation Impact Analyses must show how the proposed development will affect the existing and future transportation network. If the final use(s) of the proposal are not determined at the time of the study, the land use with the greatest overall traffic impact must be assumed for the study. Once the City has reviewed the analysis and comments have been returned to the Developer, any required changes must be incorporated in the analysis and a revised report must be submitted to the City for final review and approval.

### 3-5.2 TRAFFIC IMPACT ANALYSIS CONTENTS

While individual reports may vary in style and format, certain information must be included as identified in the Public Works Department TIA checklist and guidelines on preparation of TIAs. The amount of detail required, as well as the overall extent of the study, will be determined during the pre-application conference on a project-specific basis. General requirements of the TIA are outlined below. More detailed requirements are provided in the TIA checklist and guidelines.

#### 1. Project Description

- a) Project type and size.
- b) Project location, with vicinity map.
- c) Proposed site access, with site plan.
- d) Minimum two year (from existing condition) planning horizon. Longer planning horizon may be necessary when determining ultimate size of a roadway facility or addressing multiple phases of a project.

#### 2. Existing Conditions

- a) Existing traffic volumes, daily turning movements.
- b) Daily and intersection counts completed within one year prior to a complete application date.
- c) Roadway network, including traffic control.
- d) Level of service calculations at impacted intersections and site entrances, if applicable.

- e) Parking supply.

### **3. Accident/Safety Conditions**

- a) Sight distance analysis at intersections and access points. Minimum stopping and entering sight distance as defined by AASHTO is required.
- b) Clear zone analysis (document poles, hydrants, or other obstructions near travel edge).
- c) Evaluation of accident data as available.

### **4. Trip Generation and Distribution**

- a) Trip generation using the latest ITE Generation manual or other approved method.
- b) Trip distribution and assignment map showing turning movements assigned to roadway network. The proposed development's trips are to be distributed through the street network to a level as prescribed in the City's TIA guidelines.
- c) Parking generation analysis using the latest ITE Parking Generation manual or other approved method.

### **5. Public Transit and Non-Motorized Facilities**

- a) Identification of existing transit service.
- b) Identification of existing trails, bicycle lanes, and other non-motorized facilities.

### **6. Future Conditions**

- a) Annual growth rate determined by actual data or other approved source.
- b) Future conditions, with and without the project, with commentary on compliance with concurrency requirements as needed.
- c) Level of service calculations sheets at all impacted intersections and site access points, with and without the proposed project.
- d) Parking demand analysis.
- e) Effect of proposed development on public transit and non-motorized facilities.
- f) Any transportation facilities proposed by the Imagine Bothell...Comprehensive Plan which may affect the development.

### **7. Mitigation Measures**

- a) All development activities in the City are subject to Transportation Mitigation requirements of BMC 17.04 and Transportation Impact Fees of BMC 17.045.
- b) Proposed mitigation to correct any deficiencies not addressed through BMC 17 Transportation Impact Fees.
- c) Dedication of right-of-way and associated frontage improvements.
- d) Evaluation of change in accident potential with proposals to correct safety deficiencies.

### **8. Other**

- a) Analysis of internal site circulation for vehicles, transit, non-motorized users, and handicap access.
- b) Safe walk analysis—evaluation and coordination with the Northshore

School District and the Public Works Department for providing safe walking conditions for all new residential short plats and subdivisions.

## **3-6 TRAFFIC CONTROL**

### **3-6.1 DISRUPTION OF TRAFFIC**

All construction and/or maintenance within the right-of-way must conform to the provisions of the applicable connection/access permit, the MUTCD, WSDOT Design Manual, and other applicable referenced requirements of the Bothell Standards. The Public Works Department may stipulate or restrict hours of construction to minimize disruption of traffic on the street system. If construction activity within the right-of-way causes undue disruption of traffic, or creates safety hazards on the street system, or if the construction activity is not in compliance with the traffic control specifications in the permit, the Public Works Director may advise the Developer or the Developer's contractor of the need for immediate corrective action, and may order immediate suspension of all or part of the work, if deemed necessary. Failure to comply with this provision may result in permit modification or revocation. See Chapter 7 and Standard Details 700 Series.

All traffic control devices, signing, striping, and other pavement delineation must utilize the most current version of the MUTCD as a guideline when preparing designs and traffic control plans. It is the Developer's responsibility to furnish all materials and labor as necessary to install all traffic control to satisfy project requirements. All required signage (traffic control and street name signs), striping, and other delineation, must be shown on the street improvement plans prior to plan approval.

### **3-6.2 TRAFFIC SIGNAL PLANS AND SPECIFICATIONS**

Traffic signal plans and specifications and other traffic control devices must be consistent and in conformance with regulations, policies, procedures, and specifications of MUTCD, AASHTO, WSDOT, and Snohomish County.

The Developer is responsible for securing any state and local permits needed for traffic signalization and regulatory signing and marking.

All signals must be equipped with preemption that is compatible with the equipment approved by the Fire Department. New traffic signals installations must include a minimum of one spare conduit run for any arterial crossing.

Warrants for traffic signals must be consistent with the practices set forth in the MUTCD. The Public Works Director will determine consistency with these practices based on submitted information by the Developer when determining if a traffic signal is warranted and consistent with city planning.

Traffic signal interconnect to nearby affected signals may be required for any new traffic signal installation to promote progression of traffic and improved efficiency of the travel stream.

New mast arm street name signs must include the City logo and lettering as prescribed in Standard Detail 386.

### **3-6.3 CHANNELIZATION PLANS**

All designs must be consistent with the MUTCD, AASHTO, WSDOT Design Manual, and the Bothell Standards. Plans must be prepared by a licensed engineer, registered in the state of Washington, with experience in preparation of channelization plans. A pre-design meeting may be required to identify key parameters of the design.



Standard Details 370 through 384 show typical lane configurations and pavement markings. All new crosswalk installations must be thermoplastic or equal with supplemental signing as determined necessary by the Public Works Director. Mid-block crosswalks will require supplemental lighting or special treatment to maximize safety, as determined by the Public Works Director. Use of raised pavement markers supplemental to pavement lane striping may be required as determined by the Public Works Director.

## 3-7 FIRE APPARATUS ACCESS

As required by the Fire Marshall, every building in the City of Bothell must be accessible to fire apparatus from the moment combustible materials are delivered or construction begins by way of fire apparatus access roadways, as defined in the International Fire Code and approved by the Fire Marshall.

Fire apparatus access roadways must be in an approved easement or tract with the exception of parking lot lanes. Inside turning radii for all access roadways must provide for fire apparatus turning movements as approved by the Fire Department. All fire apparatus access roadways must meet Bothell Standards.

Access roadways that are constructed at the end of a public or private access tract road will be considered in the overall total length of the public or private access roadway. At the roadway end, if the combined total length of the public or private access roadway, measured from the nearest curb of the connecting roadway to the furthest building lot's front property line is greater than 150 feet and serving three or more building lots, a hammerhead turn around will be required. If the overall total length of the public or private access roadway is greater than 350 feet but the buildings are not sprinkled, then a cul-de-sac turnaround must be provided. When buildings are sprinkled the overall total length of the public or private access roadway may be up to 600 feet before a cul-de-sac turnaround is provided.

At delivery of combustible materials or beginning of construction, approved fire apparatus access roadways must be constructed of hot mix asphalt, or other approved roadway material or concrete, capable of supporting the imposed fire apparatus weights identified below. The required fire department access must be recognizable day or night and must be free of obstructions, including parking of vehicles, staging of construction materials or equipment. Temporary construction gates may be used as approved by the Fire Department. A "Stop Work" or "Unsafe to Occupy" order will be issued upon failing this section of this standard.

Fire Department access roadways must be designed and constructed to support the imposed weight of any fire apparatus. The minimum design weight for fire apparatus access roadways must be no less than 35 tons and outrigger point loads of 75 psi over a two (2) feet by two (2) square or 43,200 pounds. All Fire Department access roadways must have a clear, unobstructed vertical clearance of 13 feet six (6) inches. The maximum allowable grade on fire apparatus access roadways must not exceed 15 percent. To mitigate unusual circumstances, an 18 percent grade may be approved by the Fire Marshall and Public Works Director.

Fire Department access roadways serving only one or two single-family lots may be reduced to 16 feet of paved surface as approved by the Fire Marshall. This access roadway must be placed in a separate tract or easement at least 18 feet wide plus any slope easements that may be necessary. There must be no vehicle parking, traffic calming elements or any other obstructions allowed within the paved surface.

Fire Department access roadways serving only three or four single-family lots must be 20 feet of paved surface as approved by the Fire Marshall. This access roadway must be placed in a separate tract or easement at least 22 feet wide plus any slope easements that may be necessary. There may be no vehicle parking, traffic calming elements or any other obstructions allowed within the paved surface.

## **3-8 SURVEYING AND MONUMENTATION**

### **3-8.1 DESCRIPTION**

This work consist of all the surveying and monumentation required to construct the project as described in the approved plans and the Bothell Standards.

Monuments must be located at all centerline intersections of intersecting streets. Curved streets must be monumented at the centerline point of intersection (PI), if it falls within the street pavement; otherwise the point of curvature (PC) and point of tangency (PT) of the curve must be monumented.

The Developer must furnish all materials and install monuments and castings in accordance with the approved plans and where directed by the Public Works Director. All survey work must be performed by a Professional Land Surveyor (PLS) licensed in the state of Washington. The monument disk must be furnished and installed by the Developer per Standard Detail 360.

Surveying, as required to construct a given project per the approved plans, must be furnished by the Developer at no expense to the City. It is required that, as a minimum, survey stakes be set for new curb and gutter construction, for both horizontal and vertical control corresponding to the City's current datum. Any water, storm drain, or sanitary sewer mains which are to be constructed in easements, are to have survey offset stakes set prior to starting work. Any deviation from that staked line must be left uncovered and re-surveyed to realign the easement as required and for as-built information.

Any project that impacts an existing monument must re-survey the monument after the work is completed so it can be used for horizontal and vertical control.

### **3-8.2 MATERIALS**

Materials for monumentation must conform to Standard Detail 360. The cover and seat must be machined so as to have perfect contact around the entire circumference and full width of bearing surface.

### **3-8.3 CONSTRUCTION**

The Developer must provide the surveying required to establish or perpetuate land corner monumentation as may be required on the project.

All land corner surveying must conform to the requirements of RCW 58.09. If the Developer's surveyor replaces or restores an existing or obliterated General Land Office (GLO) corner, it is the Developer's responsibility to file Land Corner Records for these monuments with the County Auditor's Office. When all land corners have been established, replaced, or restored and monumented as described herein, the surveyor must certify this information with a letter to the Public Works Director and transmit copies of any recorded surveys and documents. This certification letter must include the location of the monumented corner(s) and certify that all land corner(s) have been monumented as described herein.

The City reserves the right to check survey points and/or the correct locations and elevations of new construction. These spot-checks will not change the requirements for normal checking and testing as described elsewhere, and do not relieve the Developer of the responsibility of producing a finished

product that is in accordance with the approved plans. If errors are found due to errors or omissions by the Developer's survey activities, the Developer must correct the errors, including removing and replacing improvements, and pay all expenses, including the cost to re-survey.

The Developer's surveyor must provide the City with a copy of the recorded survey, survey notes, and a reproducible final drawing. If the survey was prepared on CADD, a disk of drawing must also be provided to the City.

## **3.9 STREET ILLUMINATION AND ELECTRICAL POWER**

### **3-9.1 GENERAL**

Street lighting systems must conform to the applicable portions of the APWA/WSDOT Standard Specifications Section 8-20 and the Illuminating Engineering Society (IES) manuals, except as modified by the City of Bothell herein, according to franchise agreements with PSE and the Snohomish County PUD, herein referred to singularly as “the utility company,” and jointly as “the utility companies” or “utilities.” Other utility providers including telephone, cable television, gas, water, and sewer districts may operate under agreement with the City and must be included in coordination of planning, installation, operation, and maintenance.

Streetlights must be provided with the development of all new subdivisions, short plats, multifamily/townhome projects, planned unit developments, and for other commercial, industrial, or institutional property development. Streetlight poles on arterials must be aluminum or steel with a concrete base. On residential access streets, direct-buried fiberglass poles or better must be provided. The extent of lighting must include as a minimum, illumination of all affected frontage roads and internal roads, whether public or private, related to the development. Additional lighting beyond project limits may be required to address safe walk connections, as determined by the traffic impact analysis for the development. Special pole styles may be installed with approval of the Public Works Director.

Streetlight locations must be approved by the Public Works Director. All new streetlights must be LED with 3000K fixtures within local access residential areas and 4000K fixtures along Collectors and Arterial Streets.

Existing street lighting systems need not conform with the illumination standards contained herein.

#### **3-9.1.1 Street Light Utility Maintenance**

Streetlights located within public right-of-way will be maintained upon completion and acceptance by Snohomish County PUD or Puget Sound Energy as described in 3-9.2 and 3-9.3. Maintenance of private streetlights is the responsibility of the property owner.

### **3-9.2 SNOHOMISH COUNTY**

Streetlights located within the Snohomish County portion of Bothell will generally be owned and maintained by the Snohomish County PUD. The Developer is responsible for construction of streetlights and all accessories necessary to energize the streetlight system, which must be consistent with Bothell Standards. When feasible, all new streetlight wiring, conduit and service connections must be located underground. Other special luminaires, which are not consistent with Snohomish CountyPUD requirements, must be approved by the Public Works Director. The installation and maintenance of special luminaires, not provided by Snohomish County PUD, is be the responsibility of the Developer.

### **3-9.3 KING COUNTY**

Construction of streetlights within the King County portion of Bothell is the responsibility of the Developer. Streetlight design must be initiated by the Developer with Puget Sound Energy and streetlight systems will generally be supplied and maintained by PSE under a franchise agreement with the City of Bothell. When feasible, all new streetlight wiring, conduit, and service connections must be

located underground. The Developer will normally be responsible for providing or obtaining necessary easements for underground power for street lighting systems designed and constructed as part of an approved development permit.

#### **3-9.4 NEW CONSTRUCTION AND RELOCATION OF EXISTING FACILITIES**

Utility companies must provide protection, support, temporary disconnection, and relocation or removal of its facilities, when required by the City. The utility company must have the option to temporarily bypass any section of temporarily disconnected or removed facilities.

Utility companies may respond to requests for relocations of its facilities by a person other than the City, if the facilities to be constructed will not become City-owned, operated, or maintained, and provided the work will not unduly delay a City construction project.

Any requirement imposed by the City which necessitates the relocation of the utility company facilities within the Franchise area will be considered a required relocation according to the franchise agreement.

##### **1. Above Ground Facilities Within the Right-of-Way**

Above ground new or relocated facilities must be located outside of the clear zone. If the proposed facility's location is within an area designated for public street or utility improvements in the City's Seven Year Capital Facilities Plan, the facilities must be placed outside of the ultimate clear zone, even if that placement necessitates the utility company's purchase of easements or other property interests. If the proposed location of the facilities is not within an area designated for improvements in the Six Year Capital Facilities Plan, the facilities may be placed outside the existing clear zone.

Wherever possible, utility poles must be located outside of the sight triangle. Poles that must be located within the sight triangle must be located to present the least sight obstruction.

##### **2. Underground Facilities**

In any area in which there are no aerial facilities, or in any area in which telephone and cable have been placed underground, the utility company must place facilities underground in the manner required by the City. However, transmission facilities (115kV or more) may be installed above ground through approvals obtained in separate permit and SEPA processes.

For roadways that are being widened and improved, the design and construction must include underground conduit to house the overhead facilities, if in the future these facilities are planned to be located underground. The location of underground conduits must be clearly shown on the engineering plans. The cost of placing conduit will be determined by the conditions of the franchise agreement.

All new electrical distribution lines must be located underground and installed at the lot line prior to the paving of streets, as required by the Bothell Standards 3-11.15.

##### **3. Excavation Permits, Bonds, Safety, and Restoration**

The utility company must obtain all other permits which might be required before the City will issue any right-of-way invasion permits. Before undertaking any of the work authorized by a franchise agreement with the City, the utility company must furnish a bond executed by the utility and a corporate surety authorized to do business in the state of Washington, in the sum determined by the Public Works Director to be sufficient to insure performance of the utility company's obligations under the permit and agreement. The bond must remain in effect until the work is accepted by the City.

If either the utility or the City plan to excavate in any area covered by a franchise agreement, they must offer the other party an opportunity to share such excavation. Disturbed areas and pavement within the franchise area must be restored to preconstruction condition to the satisfaction of the Public Works Director. Within 10 days following construction, the utility must provide to the City as-built drawings of the completed work.

#### **4. Pole Material**

The utility company will install and maintain street lighting as requested by the City. Requests for installation, maintenance, and repair of street lighting must receive the utility's prompt attention. Upon completion of the work, the utility must transmit to the City notice of completion and a summary of any problems found.

The materials used for street lighting poles must be consistent with those poles already installed near or along the area in which new poles are to be installed. The utility will not supply, install or maintain custom non-standard street lighting poles.

#### **5. Placing City Signs and Communications Hardware on Utility Poles**

The City must have the right, subject to the limitations of RCW 80.54 or any other applicable laws, to post City signs on utility poles within each franchise area. The City must also have the right, subject to the same limitations, to install and maintain communications hardware on each utility company's poles.

#### **6. Moving or Removing Buildings on City Streets**

Any person or entity seeking a City permit to move or remove a building within the franchise area must make prior arrangements with PSE (in King County) or Snohomish County PUD regarding schedule, methods, and travel route. All applications must include an agreement to indemnify and save the City and PSE or Snohomish County PUD, as applicable, harmless from any and all claims and demands made against them on account of injury or damage to persons or property arising out of or in conjunction with the moving or removal of such building or other object, to the extent such injury or damage is caused by the negligence of the person or entity moving or removing such building or other object or the negligence of the agents, servants, or employees of the person or entity moving or removing such building or other object.

#### **7. Emergency Work - Permit Waiver**

In the event of an emergency in which the utility company's facilities break, are damaged, or if its construction area is otherwise in such a condition as to immediately endanger the property, life, health, or safety of any individual, the utility company must immediately take the proper emergency measures to repair its facilities without first applying for and obtaining a permit as required by the agreement with the City. However, the utility company must apply for all such permits no later than the next succeeding work day during business hours.

#### **8. Dangerous Conditions, Authority for City to Abate**

Whenever construction, installation or excavation of facilities authorized by agreement with the City has caused or contributed to a condition that appears to substantially impair the lateral support of the adjoining street or public place, or endangers the public, an adjoining public place, street utilities, or City property, the Public Works Director may direct the utility company, at its own expense, to take actions to protect the public, adjacent public place, City property, or street utilities; and such direction may include compliance within a prescribed time.

### **3-9.5 DESIGN STANDARDS**

For all new streetlight installations, the Developer must coordinate with the appropriate utility company to prepare a street lighting plan for submittal to and approval by the Public Works Director. The type of installation must be as set forth in WSDOT/APWA Standard Specifications, AASHTO, and the Bothell Standards.

All new public streetlight designs must be prepared by an engineer licensed in the state of Washington, capable of performing such work, and according to PSE, Snohomish County PUD specifications. All new developments must submit the lighting plan on a separate drawing to the City for review and approval.

### **3-9.6 DOWNTOWN STREET NETWORK ILLUMINATION STANDARDS**

The following additional requirements apply to the Downtown Subarea. The intent is to provide consistency in the downtown area to create a well-coordinated, cohesive downtown experience.

New streetlights in the downtown area must be designed in accordance with the Illuminating Engineering Society standards and located in accordance with the Illumination Standards Table and related Standard Details as noted in Table 3-9(1). Poles must be opposite across the roadway or on one side of the roadway. Staggered spacing will be allowed upon approval of the Public Works Director where there is an established staggered pattern and it is necessary to continue this pattern, or when site or safety conditions prevent locating luminaires on one side of the roadway.

The luminaires must meet the requirements described in the Downtown Bothell Streetlight Standards Table 3-9(3) that identify where specific luminaire types must be used. All lamps must be 4000k LED. Street classifications must be per the Imagine Bothell...Comprehensive Plan, as represented in Table 3-9(4) and Figure 3-9(1). The Public Works Director will designate the street classification for new roads and will designate the required design levels of pedestrian activity and conflict.

Where possible, the designated luminaires for the applicable street must be used at intersections as well. If the IES standard lighting requirements at intersections cannot be adequately met by the designated luminaires, the Developer must propose an alternate for approval by the Public Works Director. Heights of luminaires must be coordinated with signal design to ensure proper mounting of pole-mounted signal heads.

All luminaire poles, foundation and anchor bolts must be designed in accordance with the latest version of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals for a 90 MPH wind zone and 25 year structure design life. The design of the luminaire poles, foundation and bolts must accommodate installation of banners and wayfinding signs. Foundation and anchor bolts structural calculations stamped by a structural engineer licensed in the state of Washington must be submitted for approval.

All fixtures, poles, arms, and bases must be hot-dip galvanized and powder coated exterior grade RAL-9004 (Solid Black), UV reflective properties of 60 percent or higher, gloss to be 85 percent or higher. The base must be powder coated exterior grade RAL-9004 (Solid Black), UV reflective properties of 60 percent or higher, gloss to be 85 percent or higher.

Unless approved otherwise by the Public Works Director, all luminaire poles must have two electrical receptacles at 14'-0" off the ground (or as high as possible on the pole). The receptacles must be

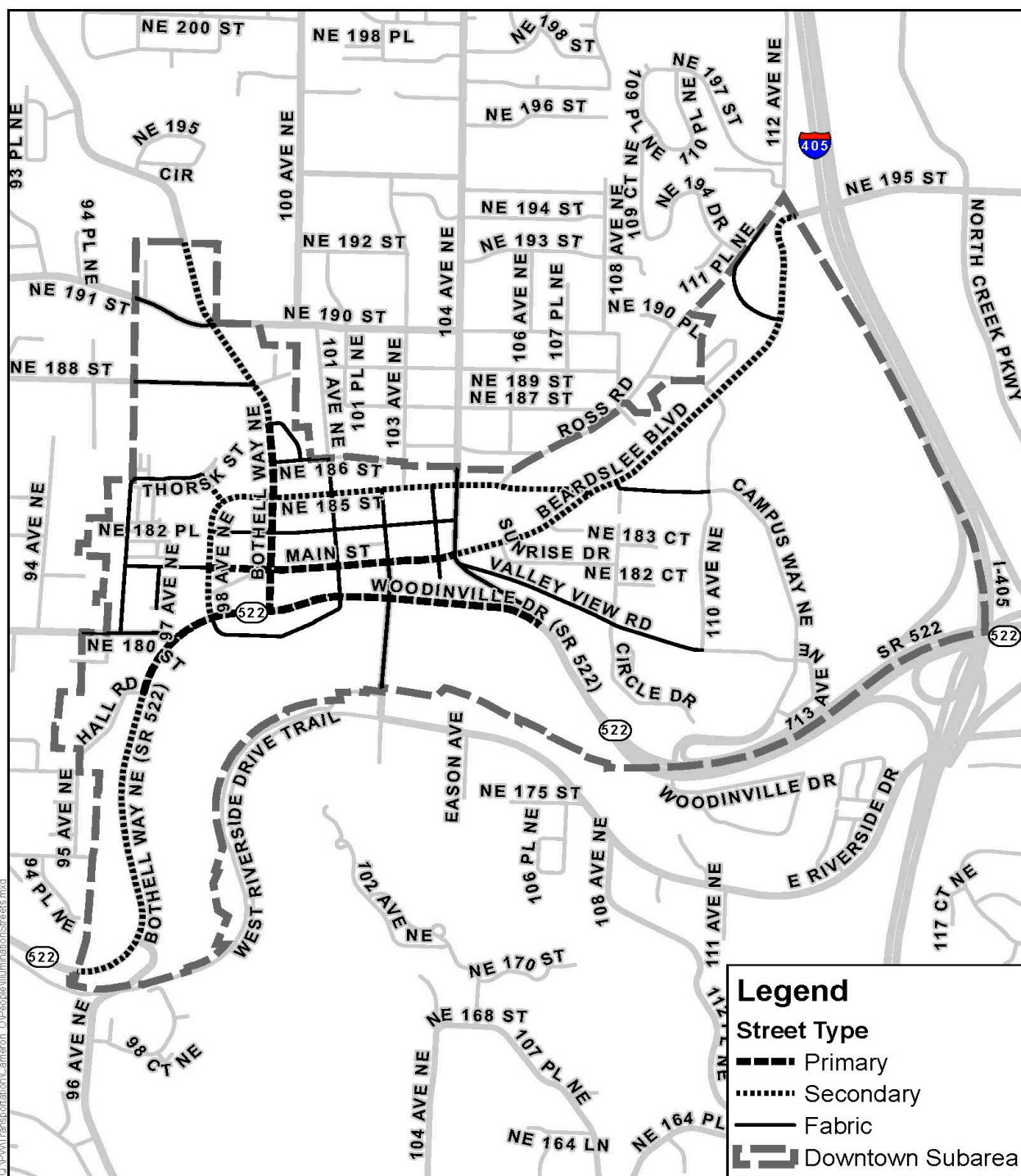


hospital grade duplex GFCI 20 amp, 120 V (Hubbell Class A GF-8300 or approved equal) with a lockable die cast NEMA 3R weatherproof cover (Model WP1030MC by Intermatic or approved equal). Black-colored Long-Life photocells must be used.

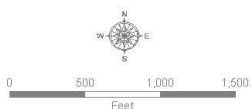
Street light standard must conform to Table 3-9(1) and in Figure 3-9(A). Other relevant information regarding specific streetlight pole and illumination needs in the downtown area are shown in Table 3-9(2). Street illumination requirements and design criteria for pedestrian conflict are noted in Table 3-9(3).

<b>Table 3-9(1)</b> <b>DOWNTOWN BOTHELL STREETLIGHT STANDARDS</b>		
<b>Street Name</b>	<b>Street Designation</b>	<b>Standard Detail #</b>
Bothell Way NE (SR 522 to Reder Wy)	Primary	D310
Bothell Way NE (SR 522 to Reder Wy)	Primary	D311
Main Street (104th Ave to 98th St)	Primary	D310
Bothell Way NE (N of Reder Wy) Beardslee Blvd Bothell Wy NE/SR 522 (180th St to Kaysner Wy)	Secondary	D313
185th Street 98th Avenue Pop Keeney Road	Secondary	D311
NE 180th Street NE 186th Street Reder Way NE 183rd Street 101st Avenue NE Any other designated Fabric Streets	Fabric	D311
Bothell Way NE/SR 522 (West City Limits to 180th)	Primary	D314

Figure 3-9 (A)



## Downtown Illumination Character Streets



The City of Bothell delivers this data (map) in an AS-IS condition. GIS data (maps) are produced by the City of Bothell for internal purposes. No representation or guarantee is made concerning the accuracy, currency, or completeness of the information provided.

**Date:** 4/4/2019



Table 3-9(2)

<b>STREET CLASSIFICATIONS FOR ILLIMUNICATION PURPOSES*</b>		
<b>Street Name</b>	<b>Classification</b>	<b>Street Designation</b>
SR 522	Principal Arterial	Primary
Bothell Way NE	Principal Arterial	Primary
Beardslee Boulevard	Minor Arterial	Secondary
Main Street (Historic)	Minor Arterial	Primary
Main Street (Extension)	Collector	Primary
NE 185th Street (east and west legs)	Collector	Secondary
98th Avenue NE	Collector	Secondary
NE 180th Street	Collector	Fabric
112th Avenue NE	Collector	Fabric
NE 186th Street (east and west legs)	Local	Fabric
Reder Way (east and west legs)	Local	Fabric
NE183rd Street (east and west legs)	Local	Fabric
101st Avenue NE	Local	Fabric
Pop Keeney Road	Local	Secondary

\*Refer to most current IES Guidelines

Table 3-9(3)

<b>PEDESTRIAN CONFLICT AREAS – DESIGN CRITERIA AT INTERSECTIONS</b>		
<b>Level of Pedestrian Conflicts at Specific Intersections</b>		
<b>Street</b>	<b>Intersecting</b>	<b>Pedestrian Conflict</b>
Bothell Way NE/SR 522	Bothell Way NE	Medium
	101 <sup>st</sup> Avenue NE	N/A (No Crossing)
	NE 180 <sup>th</sup> Street	Low
	98 <sup>th</sup> Avenue NE	Medium
Bothell Way NE	Main Street	Medium
	NE 183 <sup>rd</sup> Street	Medium
	NE 185 <sup>th</sup> Street	Medium
	NE 186 <sup>th</sup> Street	N/A (no crossing)
	Reder Way	Medium
98 <sup>th</sup> Avenue	Main Street	Medium
NE 185 <sup>th</sup> Street	Pop Keeney Road	Medium

MAINLINE		
Level of Pedestrian Conflicts Along Mainline		
Street	Limits	Pedestrian Conflict
Bothell Way NE	Bothell Way NE/SR 522 to Reder Way	Low
Main Street	98th Avenue NE to 104th Avenue NE	Medium
Beardslee Boulevard	104th Avenue NE to I-405 ramps	Medium
98th Avenue NE	SR 522 to NE 185th Street	Medium
NE 185th Street	98th Avenue NE to 102nd Avenue	Medium
	102 <sup>nd</sup> Avenue to 104 <sup>th</sup> Avenue NE	Low
NE 183rd Street	98th Avenue NE to 102nd Avenue	Medium
	102 <sup>nd</sup> Avenue to 104 <sup>th</sup> Avenue NE	Low
112th Avenue NE	Ross Road to Beardslee Boulevard	Medium
Pop Keeney Road	Full Extent	Medium
NE 186th Street	Full Extent	Low
Reder Way	Full Extent	Low

### High

Significant number of pedestrians expected on sidewalks or crossing streets in darkness; includes downtown retail areas, theaters, concert halls, stadiums, transit terminals, etc

### Medium

Less number of pedestrians utilizing sidewalks at night; includes downtown office areas, library and apartment blocks, neighborhood shopping, industrial, etc.

### Low

Low residential developments and semi-rural areas

## 3-9.7 DOWNTOWN STREET NETWORK SMALL CELL AESTHETIC, DESIGN, AND CONCEALMENT STANDARDS

The following requirements apply to small cell wireless facilities placed within the Downtown Illumination Character Street public rights-of-way as shown in Figure 3-9.6.A and identified within Table 3.9(4). These public rights-of-way are also known as the Downtown Design District and are intended to create a well-coordinated, cohesive downtown experience. Because the rights-of-way of the designated streets within the Design District are relatively narrow in width and the streets are adjacent to and surrounded by other street rights-of-way as well as public and private property that offer alternative opportunities for small wireless deployments, the alteration of the Design District streetscape and ornamental utility structures is strongly discouraged. Wireless providers are encouraged to begin design of their local networks in a manner that avoids locating facilities within the Design District rights-of-way.

### 3-9.7.1 APPLICANT RESPONSIBILITIES

An applicant or provider who desires to place a small wireless facility within the Design District must demonstrate through technical analysis and other information as required by the Director that because of technical infeasibility, the applicant cannot locate the small wireless facility on an existing or replacement pole that is within 500 feet of the Design District recognizing that alternative rights-of-way are close to and surround the Design District.

### **3-9.7.2 DESIGN DISTRICT AESTHETIC AND CONCEALMENT REQUIREMENTS.**

An applicant who successfully demonstrates that the small wireless facility cannot be located outside the Design District pursuant to 12.11.120(B), must provide technical analysis and other information as identified by the Director that demonstrates the small wireless facility occupies the minimum volume, size, footprint, height, and visual appearance technically feasible including:

1. Small wireless equipment, excepting only antennas, antenna shrouds, antenna mounts, and cut-off switches, must be placed underground to the maximum extent technically feasible. Above ground equipment may be allowed by the Director only if the applicant demonstrates it is technically infeasible to place the small wireless equipment underground. Any approved above ground equipment must be concealed according to the following hierarchical preference:
  - a. Incorporate equipment within the base and/or interior of the utility pole or street light standard, provided that the diameter of the pole base and the pole is not increased more than is technically necessary and the street light standard appearance matches the selected appearance as specified within the Bothell Standards;
  - b. Place equipment within dual purpose street furniture such as benches, refuse containers, tables, chairs, aesthetic and artistic elements, and other city-approved furniture that include space for an equipment enclosure. The design, appearance and placement of such dual purpose furniture must be consistent with the Bothell Standards;
  - c. Only if, due to technical infeasibility, equipment cannot be placed consistent with the above preferences, an applicant may propose mounting equipment to the side of a new or existing utility pole or street light standard and must be consistent with the following:
    - i. Above ground equipment must be the minimum volume technically feasible;
    - ii. All equipment must be enclosed within a solid, durable cabinet;
    - iii. Equipment enclosures must match the color of the pole as specified within the Bothell Standards;
    - iv. Horizontal clear dimension must be maintained around the enclosure to provide the minimum Pedestrian Accessible Route width as established within the Bothell Standards;
    - v. A minimum vertical clear overhead dimension as established within the Bothell Standards must be maintained between the bottom of the enclosure and the sidewalk or ground surface beneath the enclosure; and
    - vi. The equipment must be placed to have the least possible impact upon the light distribution of the street light fixture.
2. All utility connections, including but not limited to electrical and communication connections, must be underground and/or concealed within the utility pole, to the maximum extent

technically feasible. Sidewalk and pavement restoration must be completed as specified within the Bothell Standards;

3. Pole extensions that support antennas and antenna mounts installed on existing light standards must match the shape of the configuration, vertical taper and color, of the utility pole or street light standard as specified within the Bothell Standards;
4. Antennas and antenna shrouds or skirts must be the smallest volume technically feasible and must match the color of the street light fixture specified within the Bothell Standards. All antenna shrouds or skirts must be either octagonal, cylindrical, or rectangular in shape;
5. The maximum allowed height of a small wireless facility pole extension within the Design District must be as established within the Bothell Design and Construction Standards unless the applicant can establish that the height limitation would violate the provisions of federal law; and
6. All new or replacement utility pole or street light standards must be consistent with the aesthetic, design and concealment treatments of the Bothell Municipal Code and these Standards.

Table 3-9(5) DOWNTOWN BOTHELL SMALL CELL WIRELESS STREETLIGHT TREATMENTS			SMALL CELL TREATMENT
Street Name	Street Designation	Standard Detail #	Small Cell Wireless treatment Detail #
Bothell Way NE (SR 522 to Reder Wy)	Primary	D310	SCD310
Bothell Way NE (SR 522 to Reder Wy)	Primary	D311	SCD311
Main Street (104th Ave to 98th St)	Primary	D310	SCD310
Bothell Way NE (N of Reder Wy) Beardslee Blvd Bothell Wy NE/SR 522 (180th St to Kaysner Wy)	Secondary	D313	SCD313
185th Street 98th Avenue Pop Keeney Road	Secondary	D311	SCD311
NE 180th Street NE 186th Street Reder Way NE 183rd Street 101st Avenue NE Any other designated Fabric Streets	Fabric	D311	SCD311
Bothell Way NE/SR 522 (West City Limits to 180th)	Primary	D314	SCD314

## 3-10 ASPHALT, CONCRETE, AND PAVEMENT PATCHING

### 3-10.1 DESCRIPTION

This work consist of asphalt concrete paving and the patching of various types of pavement cuts, the performance of which must be in accordance with the Bothell Standards, the current WSDOT/APWA Standard Specifications and Standard Details 305 through 311.

### 3-10.2 MATERIALS

All materials must conform to the requirements in the WSDOT/APWA Standard Specifications as follows:

1. Asphalt concrete pavement, including patching, must conform to hot mix asphalt meeting the requirements of 5-04, 9-02, and 9-03.
2. Paving asphalt must conform to Grade PG 64-22.
3. Asphalt for a temporary patch must meet the requirements of 9-02.
4. Tack coat must be emulsified asphalt Grade CSS-1 as specified in 9-02.1(6).
5. Crack sealing must conform to asphalt rubber material.
6. Geotextile fabric for pavement reinforcement must be needle-punch non-woven 100 percent polypropylene. Products such as Petromat or Supac as manufactured by Phillips Fiber Corporation are acceptable. Other products may be submitted by the Developer to the Public Works Director for review as equal substitutions.
7. Asphaltic binder for use with geotextile fabric must conform to the manufacturer's recommendations for the fabric used. Cutback asphalts cannot be used with polypropylene fabrics due to reactions with solvents at high temperatures.
8. Crushed Surfacing Top and Base Courses must meet the requirements of 9-03.9.(3).
9. Cement concrete pavement patch must be Class 4000 meeting the requirements of 6-02.
10. Permeable pavement and pervious concrete pavement must adhere to APWA General Special Provisions (GSPs), Specifications 2-06.3(3), 2-06.5, 4-04.2 (9-03.9 (2)). Opt 1, 4-04.2 (9-03.9 (2)) Opt. 2, 4-04.2 (9-03.9 (2)) Opt 3., 4-04.3(5), 4-04.4, 4-04.5, 4-SA2, 5-04.1,5-04.2 (9-03.8), 5-04.3, 5-04.3(1), 5-04.3(7)A, 5-04.3(8) A1.Opt. 2, 5-04.3(8) A6 Opt.2, 5-04.3(9), 5-04.3(10) A, 5-04.4, 5-04.5, B, 5-06.SA, and 9-03.6.

### 3-10.3 CONSTRUCTION REQUIREMENTS

#### 3-10.3.1 General

Signs, barricades, lights, and other warning devices must be installed per the requirements of the current MUTCD and must be maintained 24 hours a day until the roadway work is completed and ready for traffic. See 1-10.

The placing and compaction of the trench backfill and the preparation and compaction of the subgrade must be in accordance with the various applicable sections of the WSDOT/APWA Standard Specifications except as approved by the Public Works Director.

Compaction of the subgrade must be completed prior to the required asphalt work or patching as determined in the WSDOT Design Manual.

A minimum full-lane width, 2-inch minimum thickness grind and overlay is required for road widening or utility patches parallel to roadway. At the direction of the Public Works Director, up to full width, 2-inch minimum thickness overlay is required where other roadway cuts and patches are across the roadway width. Transverse utility trenches must be restored with full road width Trench Cut patch (additional pavement removal and replacement) extending a 5-foot minimum beyond trench edge.

Pavement patching must be scheduled to accommodate the demands of traffic and must be performed as rapidly as possible to provide maximum safety and convenience to public traffic.

Before the pavement patch is constructed, the pavement must be saw cut or ground (zipper) so that the marginal edges of the patch will form a rectangular shape with straight edges and vertical faces.

When required, cold patching along the edge of existing roadways and at interfaces with existing pavements, must be completed to the widths and depths established in the approved plans, specifications, and Bothell Standards. The cold patching should be completed prior to trenching, when feasible, so that remaining pavement patching and overlays can be completed in a uniform manner.

Geotextile fabric materials, when required in the approved plans, specifications, and Bothell Standards, must be placed and constructed according to the manufacturer's recommendations. Only contractors experienced in the placement of the material must be responsible for placement. The Developer must review the project conditions, proposed placement methods, and equipment to be used with the City Inspector.

#### **3-10.3.2 Asphalt Concrete on Granular Base**

After the Crushed Surfacing Course subgrade has been leveled and compacted, Hot Mix Asphalt must be placed to the thickness indicated on the approved plans. Asphalt must be compacted to a minimum 91 percent of the reference maximum density as determined by AASHTO method T209 or current WSDOT Standards.

#### **3-10.3.3 Temporary Pavement Patching**

The Developer must furnish, place, and maintain temporary pavement patching, at locations as directed by the engineer, until such time as a permanent pavement patch can be made. Generally, the permanent patch must be completed within two weeks of the completion of trenching and road repairs, unless an extension is granted by the Public Works Director.

A temporary pavement patch must consist of ½ HMA or approved cold mix paving product compacted to a firm and unyielding surface.

Temporary asphalt patching will be required where roadway or walk is needed for vehicular or pedestrian traffic during the construction period, until permanent pavement and sidewalks can be constructed.



In the event that the temporary surface subsides after the initial placement, additional MC 250 or Crushed Surfacing must be applied to maintain the surface.

#### **3-10.3.4 Cement Concrete Pavement Patching**

Streets that have cement concrete pavements overlaid with asphalt concrete must be patched as shown on Standard Detail 317. After the Crushed Surfacing Top Course subgrade for the pavement has been constructed and compacted to line and grade, the cement concrete pavement patch must be placed and struck off to a thickness of 1 inch greater than the existing pavement or six (6) inch minimum, whichever is greater. All work must be in accordance with 5-05 of the WSDOT/APWA Standard Specifications, except as modified by the Bothell Standards.

The cement concrete portion of the patch must be Class 4000. The thickness must be 1 inch thicker than the existing concrete base or 6 inches, whichever is greater. The top surface of the concrete patch must match the top surface of the existing concrete base. In no case may the top of the concrete be higher than the top of the existing concrete base. Joints must be placed to match existing or as directed by the Public Works Director.

Expansion joints and control joints must be placed to match existing or as directed by the Public Works Director. The surface of the concrete patch must be finished and brushed with a fiber brush to improve bonding with the asphalt overlay. Approved curing compound must be placed on the finished concrete immediately after finishing.

Asphalt concrete plant mix must not be placed until three days after the cement concrete base has been placed or otherwise permitted by the Public Works Director. The asphalt concrete plant mix must not be placed until the concrete base has received a tack coat of CSS-1 at a rate of 0.12 to 0.20 gallons per square yard. The edges of the existing asphalt and castings must also be painted with the tack coat. The asphalt concrete pavement must then be placed, leveled, and compacted to conform to the surface of the existing asphalt pavement. Immediately thereafter, all joints between the new and original asphalt pavement must be painted with CSS-1 asphalt rubber product and covered with dry sand before the asphalt solidifies.

## 3-11 UNDERGROUND UTILITIES

### 3-11.1 GENERAL

1. The WSDOT/APWA Standard Specifications apply unless modified herein by the Bothell Standards.
2. Soil treatment including but not limited to fly-ash and cement, may not be used as in fill or trench backfill without approval by the Public Works Director and an approved placement, testing, and water-quality inspection program.
3. When trenching through existing pavement, the open cut must be a neat line made by either saw cutting, jackhammering, or ground on a continuous line. Saw cutting will be required unless the cut is made prior to reconstruction or an overlay.
4. Temporary pavement patch must be accomplished by using cold mix, ½" HMA, steel plates, or the product Easy Street or equal, as directed by the Public Works Director.
5. Where trench excavation equals or exceeds a depth of 4 feet, the Developer must provide, construct, maintain, and remove, as required, safety systems that meet the requirements of the Washington Industrial Safety and Health Act, RCW 49.17, including WAC 296-155. The trench safety systems must be designed by a qualified person, and meet accepted engineering requirements (see WAC 296-155-650-66411).
6. The Developer must furnish, install, and operate all necessary equipment to keep excavations above the foundation level free from water during construction, and must dewater and dispose of the water so as not to cause injury to public or private property or nuisance to the public. Sufficient pumping equipment, in good working condition, must be available at all times for all emergencies, including power outage, and must have available at all times competent workers for the operation of the pumping equipment.
7. Compaction tests will be required to ensure adequate compaction on all lifts. All compaction tests must be conducted by a licensed testing laboratory at the expense of the Developer.
8. Water jetting or settling of backfill in trenches is not permitted.

#### 3-11.1.1 Requirement to Underground Utilities Associated with Developments

In accordance with Imagine Bothell...Comprehensive Plan, Utilities and Conservation Element Policies UC-P4 and UC-P5, all projects which are required to construct frontage improvements per BMC 17.09 must, in conjunction with such improvements, underground all existing overhead and new electrical distribution lines and other utilities, including, but not limited to, signal interconnect electrical lines, subject to the limitations set forth in BMC 17.09.010.

### 3-11.2 TRENCH EXCAVATION

#### 1. Dimensions

The length of trench excavation in advance of pipe laying must be kept to a minimum and in no case exceed 150 feet, unless specifically authorized by the Public Works Director. The maximum permissible trench width between the foundation level to the top of the pipe must be 40 inches for pipe 15 inches or smaller inside diameter, or 1 ½ times the pipe inside diameter, plus 18 inches for pipe 18 inches or larger (see Standard Details 470 and 471). If the maximum trench width is exceeded without written authorization of the Public Works Director, the Developer will be required to provide pipe of higher strength classification or provide a higher class of bedding, as required by the Public Works Director.

## **2. Interferences**

The Developer must not interfere with any existing utility without the written consent of the Public Works Director and the utility company or person owning the utility. If it becomes necessary to remove an existing utility, this must be completed by its owner. No utility owned by the City may be moved to accommodate the Developer unless the cost of such work is borne by the Developer. The cost of moving privately-owned utilities must be similarly borne by the Developer unless other arrangements have been made with the person owning the utility. The Developer must support and protect by timbers or otherwise all pipes, conduits, poles, wire, or other apparatus which may be in any way affected by the excavation work, and do everything necessary to support, sustain, and protect them under, over, along, or across the work. In case any of the pipes, conduits, poles, wires, or apparatus should be damaged, they must be repaired by the agency or person owning them, and the expense of such repairs will be charged to the Developer, and its bond will be liable therefor. The Developer will be responsible for any damage done to any public or private property by reason of the breaking of any water pipe, sewer, gas pipe, electric conduit, or other utility, and its bond will be liable therefor. The Developer must inform itself as to the existence and location of all underground utilities and protect the same against damage.

## **3. Protection of Adjoining Property**

The Developer must at all times, and at its own expense, preserve and protect from injury any adjoining property. Where in the protection of such property it is necessary to enter upon private property for the purpose of taking appropriate protective measures, the Developer must obtain a license from the owner of such private property for such purpose, and if he cannot obtain a license from such owner, the Public Works Director may authorize him to enter the private premises solely for the purpose of making the property safe. The Developer must, at its own expense, shore up and protect all buildings, walls, fences, or other property likely to be damaged during the progress of the excavation work and will be responsible for all damage to public or private property or highways resulting from the Developer's failure to properly protect and carry out the work. Whenever it may be necessary for the Developer to trench through any lawn area, the sod must be carefully cut and rolled and replaced after ditches have been backfilled, as required in this chapter. All construction and maintenance work must be completed in a manner calculated to leave the lawn area clean of earth and debris and in a condition equal to or better than that which existed before such work began. The Developer must not remove, even temporarily, any trees or shrubs which exist in parking strip areas or easements across private property without first having notified and obtained the consent of the property owner, or in the case of public property, City of Bothell.

## **4. Fences, Barriers**

The Developer must erect such fence, railing, or barriers about the site of the work as to prevent danger to persons using the city street or sidewalks, and such protective barriers must be maintained until the work is completed or the danger removed. One-half hour prior to sunset, there must be placed upon such place of excavation and upon any excavated materials or structures or other obstructions to streets suitable and sufficient lights which must be maintained throughout the night for the entire construction period. It is unlawful for anyone to remove or tear down the fence or railing or other protective barriers or any lights provided there for the protection of the public.

## **5. Removal of Attractive Nuisance**

It is unlawful for the Developer to allow or permit to remain unguarded, at the place of excavation or opening, any machinery, equipment, or other device having the characteristics of an attractive nuisance likely to attract children and hazardous to their safety or health.

### **3-11.3 TRENCH BACKFILL**

Trench backfill must conform to Standard Details 470 and 471.

Unsuitable backfill material must be removed from the site and hauled to an approved disposal site. The Contractor must provide the Public Works Director with the location of all disposal sites to be used and copies of the permits and approvals for such disposal sites.

Imported material must meet the requirements of Gravel Borrow, as specified in 3-19 of these Standards, or Crushed Surfacing Top Course, as specified in 9-03.9(3) of the WSDOT/APWA Standard Specifications.

### **3-11.4 COMPACTION**

Trench backfill must be spread in layers and compacted by mechanical tampers of the impact type approved by the Public Works Director. The backfill material must be placed in successive layers with the first layer not to exceed 18" above the pipe, and the following layers not exceeding 12 inches in loose thickness, with each layer being compacted to the density specified below:

1. Improved areas such as street and sidewalks must be compacted to at least 95 percent of maximum dry density to within 4 feet of subgrade. Backfill 4 feet and deeper must be compacted to at least 90 percent of maximum dry density.
2. Unimproved area or landscape areas must be compacted to at least 90 percent of maximum dry density.

### **3-11.5 TRENCHING LONGITUDINAL TO ROADWAY**

All utilities that are within the roadway section and longitudinal to the roadway, must be backfilled according to the requirements listed in Standard Details 470 and 471 to the pavement patch level or subgrade, whichever applies. CDF backfill will be required, as directed by the Public Works Director.

When groundwater levels are encountered within 3 feet of finished grade, a 4-inch diameter, rigid PVC perforated pipe drain must be installed parallel to all proposed mains in the same trench. This perforated pipe must be bedded in a minimum 6 inch depth of crushed rock. Crushed rock backfill must further be placed to a minimum height of 6 inches above the pipe. The pipe must be installed a minimum of 3 feet below finished grade. Drain pipes must connect to the City storm system at their low point. If no City storm system is available for connection, in lieu of installing the drain pipe system described above, the entire trench section must be backfilled with Crushed Surfacing Base Course.

Pavement restoration of longitudinal trenching for all underground utilities must be completed according to Standard Detail 317. The limits of paving will be as determined by the Public Works Director on a project specific basis, and will require full lane width grinding and overlays unless otherwise approved by the Director.

### **3-11.6 TRENCHING TRANSVERSE TO ROADWAY**

Utility trenching that crosses transversely to the roadway alignment will not be permitted unless it can be shown that alternatives such as jacking, auguring, or tunneling are not feasible or unless the utility can be installed just prior to reconstruction or overlay of the road. Should an open cut be approved, the trench must be backfilled according to the requirements listed in Standard Details 470 and 471. One lane must remain accessible to emergency vehicles at all times unless other

arrangements have been previously approved by the Police, Fire, Community Development, and Public Works Departments. When high groundwater levels are encountered within 3 feet of finished grade, a four (4) inch diameter, rigid PVC perforated pipe drain must be installed parallel to all mains. This perforated pipe must be bedded in a minimum six (6) inch depth of crushed rock. This crushed rock fill must further be placed to a minimum height of 6 inches above the pipe. The pipe must be installed a minimum of 3 feet below finished grade. Drain pipes must connect to the City storm system at their low point. If no City storm system is available for connection, in lieu of installing the drain pipe system described above, the entire trench section must be backfilled with Crushed Surfacing Base Course.

Pavement restoration of transverse trenching for all underground utilities must be completed according to Standard Detail 317. The limits of paving must be as determined by the Public Works Director on a project-specific basis.

### **3-11.7 JACKING, AUGERING, OR TUNNELING**

As a condition of permit approval, in certain situations, the Public Works Director may require tunneling under pavements, buildings, railroad tracks, etc. The Developer will install the pipe by jacking, auguring, or tunneling, or installing the pipe in a casing pipe by a combination of these methods. The Developer will be liable for damage to any existing facilities as a result of the jacking, auguring, or tunneling installation work. Approvals from other agencies or companies may be required for the proposed work.

The Developer must obtain all necessary permits, approvals, and easements as may be necessary, and must provide copies to the City during the permit review process.

When use of a casing pipe is required, the Developer must select the gauge and size required, unless otherwise indicated on the approved plans. During jacking or auguring operations, particular care must be exercised to prevent caving ahead of the pipe which will cause voids outside the pipe. When the carrier pipe is installed within a casing pipe, the carrier pipe must be skidded into position in an acceptable manner and to the line and grade as designated. The annular space between the casing and the pipe must be filled with controlled density fill or as otherwise approved.

Prior to jacking or auguring activities, the Developer must submit shop drawings to the Public Works Director for approval describing the activities, including dimensioning of pit length, the size of underground borings, and a complete description of shoring.

## **3-12 GUARDRAILS**

Beam guardrails must be installed at locations determined during the project design and plan review process and as shown on the approved plans. Beam guardrail must conform to the current WSDOT Design Manual Chapter 1610.06. Project requirements for clear zone must conform to the current WSDOT Design Manual 1600.02(2). All plan submittals must include the current WSDOT Standard Plans specific to the project as noted in the current WSDOT Design Manual Chapter 1610.06. Alternative methods proposed by the Developer for providing roadway vehicle and pedestrian protection will be considered by the Public Works Director on a case by case basis.

## 3-13 MAILBOXES

New developments must provide mailboxes of the type, number, and at locations determined by the Bothell Postmaster. The Developer must provide the Postmaster with two copies of the preliminary project site plans for use in establishing locations, types, and numbering of the mailboxes. The Postmaster will retain one copy and return the other redlined set to the Developer for use in preparing final plan.

1. In the case of new road construction or reconstruction requiring mailboxes to be relocated or rearranged, the Developer must coordinate through the Bothell Postmaster for acceptable mailbox locations and to ensure uninterrupted mail service. Approved locations for mailboxes must be shown on street construction plans.
2. For new construction where existing sidewalks are located adjacent to the curb, the sidewalk must be widened to provide a clear width of not less than 5 feet, from back of mailbox structure to back of sidewalk, to allow the delivery of mail directly from the postal vehicle to the mailbox, per Standard Detail 361. Mailbox location associated with development and redevelopment adjacent to Downtown Streets must be located outside of right-of-way in accordance with 3-4.9.

## **3-14 ROCKERIES AND ROCK WALLS**

Concrete and structural retaining walls must be designed and constructed to meet the current adopted edition of the International Building Code, BMC 12.14, and BMC 18.05.

### **3-14.1 DESCRIPTION**

Work must be performed in accordance with the Bothell Standards and Standard Detail 359. Any rockeries over 4 feet high must be designed by a structural engineer licensed in the state of Washington. Additional geotechnical analysis and recommendations may be required for design and construction inspection.

### **3-14.2 GENERAL**

Surfaces accessible to pedestrians above and adjacent to rockeries over 30 inches high must be protected by a pedestrian guardrail conforming to Section 509 of the current International Building Code and Standard Details 355 and 356.

Use of ecology blocks may be approved on a case by case basis. All ecology block walls must be designed by a structural engineer licensed in the state of Washington.

A right-of-way invasion permit is required for all rock walls within the right-of-way. All other rockeries, higher than 4 feet, to be located on public or private property, require a separate building permit.

### **3-14.3 MATERIALS**

Rock for constructing new rock facings must be large broken pieces of igneous rock obtained from a commercial quarry. Rock material must be rectangular selected pieces or rock, sound and resistant to weathering. Rock must be free of soft, weathered material and seams of soft rock susceptible to deterioration.

Perforated drain pipe must be Schedule 40 machine-perforated PVC pipe. No. 2 Coarse Aggregate must conform to Section 9-03 of the WSDOT/APWA Standard Specifications.

Concrete for rockery cap must be Class 3000. Lamp black coloring agent to match the color of the rockery must be added to the cement concrete during mixing in an amount not to exceed 1½ pounds per cubic yard of concrete.

Quarry Rock must be as specified in 3.19.

### **3-14.4 CONSTRUCTION REQUIREMENTS**

The first course of rock should be placed on undisturbed soil or compacted fill. There should be full contact between the rock and soil, which may require shaping of the ground surface or slamming or dropping the rocks into place so that the soil foundation conforms to the rock face bearing on it.

As the rockery is constructed, the rocks should be placed so that there are no continuous joint planes in either the vertical or lateral direction. Each rock should bear on at least two rocks below it. Rocks should be placed so that there is some bearing between flat rock faces rather than on joints. Joints



between courses should slope downward towards the material being protected (away from the face of the rockery). Voids in the rockery face must not be greater than 50 square inches for rocks over 3 feet high and 36 square inches for rocks under 3 feet high. The maximum through void area will be 15 square inches over 3 feet high and 10 square inches under 3 feet high. Any large voids existing between each course of rock as it is placed must be filled by wedging smaller rock of the same quality into the voids in the back side of the rockery. Backfill material must not be allowed to spill freely between the voids in the rockery. The rockery must be backfilled in uniform layers as construction proceeds.

Backfill materials must be Quarry Rock per 3-19.3 of the Bothell Standards. No. 2 Coarse Aggregate per 9-03 must be used around the perforated drain pipe behind the rockery wall per Standard Detail No. 359.

The density of rock material must be a minimum of 160 pounds per cubic foot. The size categories for rock must be as follows:

<b>COMMERCIAL ROCK SIZE</b>	<b>APPROX. WEIGHT</b>	<b>MINIMUM DIMENSIONS</b>	<b>APPROX. SIZE VOLUME</b>
One-man rock	160 to 400 lb.	12 inches	1.75 c.f.
Two-man rock	500 to 800 lb.	13 inches	4 c.f.
Three-man rock	900 to 1,200 lb.	16 inches	6.6 c.f.
Four-man rock	1,300 to 1,600 lb.	18 inches	9 c.f.

Rocks less than one (1) cubic foot in volume or weighing less than 160 pounds must not be used.

## 3-15 PEDESTRIAN HAND RAILS AND GUARDRAILS

### 3-15.1 DESCRIPTION

This section applies to providing and building metal hand rails that meet the requirements of the Bothell Standards and the Public Works Director.

Pedestrian handrails must be provided where necessary to conform to requirements of the Americans with Disabilities Act (ADA).

Sidewalks, trails, and other pedestrian accessible areas which are adjacent to cut or fill slopes steeper than 1½ horizontal to one (1) vertical (1½ H:1V) with a vertical grade separation of 30 inches or greater must be protected with pedestrian handrails unless adequate horizontal clearance is provided to protect pedestrians. The rail must conform to Standard Details 355 and 356.

Surfaces accessible to pedestrians above or adjacent to rockeries or walls higher than 30 inches must be separated by an approved handrail system unless the Public Works Director determines that adequate horizontal clearance is provided.

Unenclosed floor and roof openings, open and glazed glass sides of stairways, landings, ramps, balconies or porches that are more than 30 inches above grade or floor below, and roofs used for other than service of the building must be protected by a guardrail. See the current edition of the International Building Code for specific requirements.

### 3-15.2 MATERIALS

#### **Pedestrian Handrail (Galvanized Steel and Aluminum)**

Galvanized steel and aluminum pedestrian handrails must be constructed in accordance with Standard Details 355 and 356 and the Bothell Standards. Horizontal rails and vertical support posts must be 1 to ½ inch diameter Schedule 40 standard pipe, and balusters must be ¾ inch-diameter Schedule 40 standard pipe. Vertical support posts must be on 8-foot centers and balusters on 4 inches clear space. Finished height of the railing must be 42 inches above the pedestrian walking surface. Provide slip joints at stairway expansion joints and at 24 feet on center, maximum.

### 3-15.3 FABRICATION

Before fabricating the railing, the Developer must submit six copies of the shop plans for the Public Works Director's approval. The Developer may substitute other rail connection details for those shown in the plans, if details of these changes are indicated as such in the shop plans and if the Public Works Director approves. In reviewing shop plans, the City indicates only that they appear complete and address the basic project requirements. Approval does not indicate a check on dimensions.

Welding must conform to the requirements of the Structural Welding Code AWS D1.1 for steel, and to the requirements of the "Specifications for Aluminum Structures" of the Aluminum Association, for aluminum alloys. All exposed welds must be ground flush with adjacent surfaces. Railing panels must be straight and true to dimensions. Adjacent railing panels must align with each other with a variation not to exceed 1/16 inch. Joints must be ½ matchmarked.

For structures on curves, either horizontal or vertical, the railing must conform closely to the curvature of the structure by means of series of short chords. The lengths of the chords specified must be the distance center to center of rail posts.

Steel railing units must be galvanized after fabrication. Zinc used for galvanizing must be grade Prime Western conforming to ASTM B6 with a minimum two (2) ounces per square foot.

Completed aluminum railing units must be anodized after fabrication, conforming to the requirements of the Aluminum Class 1 Anodic Coating, AA-C22-A41.

Ornamental railing must be painted with a rustproof metal primer and one coat of black ornamental iron metal paint.

#### **3-15.4 INSTALLATION**

The railing must be erected in accordance with the approved plans on anchor bolts, or in holes formed by inserts provided in the concrete railing base to receive the railing posts. Sheet metal inserts must be removed before the erection of the railing.

No railing may be erected on the structure until the sidewalk to which it is to be attached is completed and all falsework supporting the system is released.

The railing must be carefully erected, true to line and grade. Posts and balusters must be vertical with the direction from the vertical for the full height of the panel not exceeding 1/8 inch.

Slip joints must be as shown on Standard Details 355 and 356. Railing installed without slip joints will be rejected, and the Developer must install new railing.

## 3-16 CEMENT CONCRETE SIDEWALKS

### 3-16.1 DESCRIPTION

#### 1. General

This work must consist of constructing cement concrete sidewalks, thickened edge for sidewalks, curb ramps, and bus shelter pads, including excavation for the depth of the sidewalk and subgrade preparation, in accordance with the Bothell Standards, the WSDOT/APWA Standard Specifications and Standard Details 344, 345, 350, 351, 352, 353, and 354. Sidewalk drains must be provided and constructed as shown on approved plans. Cement concrete steps must be provided where indicated on the approved plans and according to Standard Details 357 and 358. Work must also comply with ADA RCW 35.68.075-35.68.076.

#### 2. Sidewalk Excavations—Footbridge

Any excavation made in or under any sidewalk must be provided with a substantial and adequate footbridge over the excavation on the line of the sidewalk. The footbridge must be at least 5 feet wide and securely railed on each side so that pedestrians can pass over safely at all times.

### 3-16.2 MATERIALS

Materials must meet the requirements of the following section of the WSDOT/APWA Standard Specifications:

1. Portland Cement	9-01
2. Aggregates	9-03
3. Pre-molded Joint Filler	9-04
4. Concrete Curing Materials and Admixtures	9-23
5. Pervious Concrete WSDOT/APWA General Special Provisions Division 5	

Slump of the concrete mix must not exceed 3 ½ inches. Lamp black coloring agent for matching the color of newly constructed cement concrete sidewalks to the color of adjacent existing cement concrete sidewalks must be added to the concrete during mixing in an amount not to exceed 1 ½ pounds per cubic yard of concrete. No lamp black may be used in curb ramps.

The use of Calcium Chloride as an admixture is prohibited.

### 3-16.3 CONSTRUCTION REQUIREMENTS

#### General

The curb and gutter section must be placed prior to the placement of the sidewalk section unless otherwise directed by the Public Works Director.

Subgrade must be approved by the construction inspector prior to concrete being placed. Expansion joints must be ½ inch by full depth and placed to match those placed in curbs, if new sidewalk is poured adjacent to a curb and gutter. In all other cases, the maximum spacing on expansion joints must be 10 feet center to center. Control joints must be ¼ the thickness of the concrete on 5-foot centers.

A minimum distance of 5 feet is required from the face of curb to any obstruction on or within the sidewalk, unless otherwise noted. Mailboxes must be set at locations approved by the Postmaster and may be adjacent to the curb in residential areas. Refer to Section 3-13 and Detail 361.

Where there is insufficient suitable native material on the project site, the Developer must furnish, place and compact gravel borrow. All sidewalks must be constructed over a minimum 4 inches of crushed surfacing top course meeting the requirements of 9-03.9(3) of the WSDOT/APWA Standard Specifications compacted to 95 percent of maximum dry density.

#### **Form and Fine Grading**

Wood forms must be 2 inch x 4 inch (nominal) in lengths of not less than 10 feet. Steel forms may be used upon approval of the Public Works Director. Forms must be staked to a true line and grade. A subgrade template must then be set upon the forms and the fine grading completed so that the subgrade will be a minimum of 4 inches below the top of the forms. Forms must be provided around all street name sign posts and traffic sign posts that are placed in concrete areas. Forms used for this purpose must be 1-foot square or 1-foot minimum diameter cutout, as approved by the Public Works Director.

#### **Placing and Finishing Concrete**

The concrete must be spread uniformly between the forms and thoroughly compacted with a steel shod strike board. Expansion joints and control joints must be located and constructed in accordance with the Standard Details 344 and 345. In construction of expansion joints, the pre-molded joint filler must be adequately supported until the concrete is placed on both sides of the joint.

Whenever castings are located in the sidewalk area, joints must be installed at the casting location to control cracking of the sidewalk. If spacing of joints or scoring is such that installation of joint material would be unsuitable, the Developer must install rebar to strengthen the sidewalk section.

Control joints must be formed by first cutting a groove in the concrete with a tee bar of a depth equal to, but not greater than, the joint filler material and then working the pre-molded joint filler into the groove. Pre-molded joint filler for both expansion and control joints must be positioned in true alignment at right angles to the line of the sidewalk and be normal to and flush with the surface. Where the sidewalk will be contiguous with the curb, it must be constructed with a thickened edge as shown on Standard Detail 345, Section C.

After the concrete has been thoroughly compacted and leveled, it must be floated with wood floats and finished at the proper time with a metal float. Joints must be edged with a ¼ inch radius edger and the sidewalk edges must be tooled with a ½ inch radius edger.

The surface must be brushed with a fiber hair brush, of a type approved by the construction inspector, in a transverse direction except that at driveway and alley crossings, it must be brushed longitudinally. The placing and finishing of all sidewalks must be performed under the control of the construction inspector; using tools approved by the construction inspector. After brush finish, the edges of the sidewalk and all joints must be lightly edged again with an edging tool to give it a finished appearance.

#### **Curing and Protection**

The curing materials and procedures specified in 5-05.3(13) of the WSDOT/APWA Standard Specifications will prevail, except that white pigment curing compounds must not be used on sidewalks.

The Developer must have readily available sufficient protective covering, such as waterproof paper or plastic membrane, to cover the pour of an entire day in event of rain or other unsuitable weather.

The sidewalk must be protected against damage or defacement of any kind until it has been accepted by the construction inspector. Sidewalk which is not acceptable to the City because of damage or defacement must be removed and replaced by the Developer.

#### **Curing and Hot Weather**

In periods of low humidity, drying winds, or high temperatures, a fog spray must be applied to concrete as soon after placement as conditions warrant in order to prevent the formation of shrinkage cracks. The spray must be continued until conditions permit the application of a liquid curing membrane or other curing media. The construction inspector must make the decision when the use of a fog spray is necessary.

#### **Cold Weather Work**

When the air temperature is expected to reach the freezing point during the day or night, the concrete must be protected from freezing. The Developer must provide a sufficient supply of straw, hay, grass, earth, blankets, or other suitable blanketing material and spread it over the pavement to a sufficient depth to prevent freezing of the concrete. The Developer is responsible for the quality and strength of the cured concrete. Any concrete injured by frost action or freezing must be removed and replaced at the Developer's expense in accordance with the Bothell Standards.

#### **Curb Ramps**

In accordance with state law, curb ramps must be provided at all pedestrian crossings with curb sections. When a ramp is constructed giving handicap access to the roadway area, a corresponding ramp at the opposite side of the roadway must also be provided and upgraded to current ADA requirements. Exact locations at each curb return will be as shown in the approved plans.

Curb ramps must be constructed in accordance with the Standard Details 350, 351, 352, 353, and 354 and as shown on the approved plans. This work must include curb ramps installed in new sidewalks and in existing sidewalks. Existing sidewalks must be neatly saw-cut full depth prior to construction of curb ramps.

Advanced tactile warning (sidewalk texturing) is to be placed per Standard Details 334 and 350. (Ramp texture must include truncated dome.) Curb ramps must not be poured integral with the sidewalk. Curb and gutter must be isolated by expansion joint material on all sides. Ramp texture must have a horizontal broom finish as shown on Standard Details referenced above.

## 3-17 CURB AND GUTTER SECTIONS

### 3-17.1 DESCRIPTION

The standard curb and gutter section must be a traffic curb and gutter per Standard Detail 340. Traffic curb and gutter standard curb and gutter must be used on both public and private roadways. Variations are subject to the review and approval of the Public Works Director.

### 3-17.2 MATERIALS

Materials must meet the requirements of the following Sections of the WSDOT/APWA Standard Specifications:

Portland Cement	9-01
Concrete Aggregate	9-03
Reinforcing Steel	9-07
Pre-molded Joint Filler	9-04
Curing Compound	9-23

The Portland Cement concrete must meet the requirements of Section 5-05 of the WSDOT/APWA Standard Specifications. Concrete mix for curbs must be Class 3000. Slump of the concrete must not exceed 3 ½ inches.

All new curb and gutter must be placed over not less than 4 inches of crushed surfacing top course compacted to 95 percent maximum dry density.

Forms may be of wood or metal at the option of the Developer, provided that the forms as set will result in a curb or curb and gutter of the specified thickness, cross section, grade, and alignment shown on the approved plans.

### 3-17.3 PLACING CONCRETE

The subgrade must be properly compacted and brought to specified grade before placing concrete. The subgrade must be thoroughly dampened immediately prior to the placement of concrete. No new curb and gutter is to be placed until the construction inspector has checked and approved the forms for line, grade and compaction. Concrete must be spaded and tamped thoroughly into the forms to provide a dense, compacted concrete, free of rock pockets. The exposed surfaces must be floated, finished, and brushed longitudinally with a fiber hair brush approved by the construction inspector.

The rate of concrete placement must not exceed the rate at which the various placing and finishing operations can be performed in accordance with the Bothell Standards.

If concrete is to be placed by the extruded method, the Developer must demonstrate, to the satisfaction of the construction inspector, that the machine is capable of placing a dense, uniformly-compacted concrete to exact section, line, and grade.

### **3-17.4 CURING AND PROTECTION**

Transparent curing compounds must be applied to all exposed surfaces immediately after finishing. Transparent curing compounds must contain a color dye of sufficient strength to render the film distinctly visible on the concrete for a minimum period of four hours after application.

The Developer must have readily available sufficient protective covering, such as waterproof paper or plastic membrane, to cover the pour of an entire day in event of rain or other unsuitable weather.

The curb must be protected against damage or defacement of any kind until it has been accepted by the construction inspector. Sidewalk which is not acceptable to the construction inspector because of damage or defacement must be removed and replaced by the Developer at their own expense.

The curing materials and procedures specified in Section 5-05.3(13) of the WSDOT /APWA Standard Specifications will prevail, except that white pigment curing compounds must not be used on curb and gutter.



## 3-18 CEMENT CONCRETE DRIVEWAY

### 3-18.1 DESCRIPTION

This work consists of cement concrete driveway and alley returns constructed at the locations shown on the approved plans and where directed by the construction inspector, and must be in accordance with the Bothell Standards, the WSDOT/APWA Standard Specifications, and Standard Details 346 and 347. See 3-4.2.6 for additional conditions for driveways.

### 3-18.2 MATERIALS

Materials must meet the requirements of the following sections of WSDOT/APWA Standard Specifications:

Portland Cement	9-01
Fine Aggregate	9-03
Coarse Aggregate	9-03
Joint Materials	9-04
Curing and Admixtures	9-23
Pervious Concrete WSDOT/APWA General Provisions Division 5	

The concrete mix must be as specified for Class 3000 and the slump of the concrete must not exceed 3 inches.

### 3-18.3 CONSTRUCTION REQUIREMENTS

#### 1. General

- a) No driveway approach may project beyond the extension of the side property line to the curb, unless the owner of the adjacent property is a co-signer of the driveway permit.
- b) There must be at least 20 feet of full height curb between driveways serving any one property frontage.
- c) There must be at least 6 feet of full height curb between driveways on adjacent lots.
- d) Driveway aprons must be constructed per Standard Details 346 or 347, as applicable. The minimum thickness of the driveway apron must be 6 inches, placed over a minimum of 4 inches of crushed surfacing top course compacted to 95 percent maximum dry density over a compacted subgrade. In all cases, subgrade and rock grade must be approved by the construction inspector prior to concrete being placed. Driveway aprons over 15 feet wide must have an expansion joint placed in the center of the apron.
- e) In locations where a new driveway is to be constructed and sidewalk, curb, and gutter is already existing, it must be totally removed and replaced to driveway standards. It is not permissible to knock off existing curb and install driveway apron. The total curb and gutter section must be removed, either by sawcutting or to the nearest expansion joint, and replaced to driveway standards.
- f) New driveways installed in areas where curb and gutter improvements are not existing, and not required, must be paved from the existing edge of pavement to the property

line, regardless of whether the remainder of the driveway on the private property is paved.

- g) In areas not fully improved with curbs and sidewalks, the elevation of the driveway at the point where it crosses the property line must not be more than 3 inches higher than the elevation of the centerline of the existing paved street, if the driveway is rising on the private property side, and no lower than level with the elevation of the centerline of the existing street, if the driveway is sloping down on the private property side.
- h) Driveways that cross bike/pedestrian trails must be designed to safely accommodate both the vehicles and the trail users. Any ramp in the trail must meet the current ADA design standards.

## **2. Excavation and Subgrade**

- a) Where directed by the construction inspector, unsuitable material in the subgrade must be removed to a specific depth and backfilled with select material such as gravel borrow conforming to 3-19.2.
- b) Before any concrete is placed, the Developer must bring the subgrade to the required line, grade, and cross-section. The Developer must maintain the subgrade in the required condition until the concrete is placed. Compaction must be to 95 percent standard density.

## **3. Forms and Fine Grading**

- a) Forms for the straight sections of the driveway or alley return must have a minimum thickness of two (2) inches and be equal to the nominal depth of the concrete. Plywood or one (1) inch lumber may be used on radii. All forms must be securely staked and blocked to true line and grade.
- b) A template must be set upon the forms and the subgrade must be fine graded to conform to the required section. The subgrade must then be compacted to the approval of the construction inspector. Prior to placement of the concrete, the subgrade must be thoroughly dampened.

## **4. Placing and Finishing**

- a) The concrete must be spread uniformly between the forms and thoroughly compacted with an approved type of strikeboard. Expansion joints and contraction joints must be located and constructed in accordance with Standard Detail 340. In the construction of expansion joints, the pre-molded joint filler must be adequately supported until the concrete is placed on both sides of the joint.
- b) Contraction joints (control joints) must be formed with a tee bar by first cutting a groove in the concrete to a depth equal to, but not greater than the joint filler material and then working the pre-molded joint filler into the groove. Pre-molded joint filler for both expansion and control joints must be positioned in true alignment and at right angles to the centerline of the driveway or alley return.
- c) After the concrete has been thoroughly compacted and leveled, it must be floated with wood floats and finished at the proper time with a metal float. Joints must be edged with ¼ inch radius edger and the driveway or alley return edges must be tooled with ½ inch radius edger.
- d) The surface must be brushed in a transverse direction in relation to the centerline of the driveway or alley return with a fiber hair brush of a type approved by the construction inspector.

## **5. Curing and Protection**

- a) The curing materials and procedures specified in Sections 5-05 and 9-23 of the WSDOT/APWA Standard Specifications and 3-17.4 of the Bothell Standards must be used. The driveway and the alley return must be protected against damage or defacement of any kind until acceptance by the construction inspector. Any driveway or alley return not acceptable, in the opinion of the construction inspector because of damage or defacement, must be removed and be replaced by the Developer.
- b) Before placing any concrete, the Developer must have on the job site enough protective paper to cover the pour of an entire day, in event of rain or other unsuitable weather conditions.

## **3-19 PROPORTIONING OF MATERIALS**

### **3-19.1 CONTROLLED DENSITY FILL (CDF)**

CDF must conform to the requirements of Section 2-09.3(1)E of the WSDOT/APWA Standard Specifications.

### **3-19.2 GRAVEL BORROW**

The gradation for gravel borrow must conform to the requirements of Section 9-03.14(1) of the WSDOT/APWA Standard Specifications.

### **3-19.3 QUARRY ROCK**

Quarry Rock must meet the requirements of Section 9-13.6 of the WSDOT/APWA Standard Specifications.

All percentages are by weight.

### **3-19.4 NON-SHRINK CEMENT SAND GROUT**

Non-shrink cement sand grout must be proportioned as follows:

- 1 part high early strength (HES) cement.
- 2 parts by weight clean fine-grained sand, well-mixed with sufficient water to obtain a stiff consistency.

Unpolished aluminum powder must be added to the dry cement in the proportion of one heaping teaspoon per sack of cement no more than 30 minutes before the grout mixture reaches its final in-place position.

The required strength of the non-shrink concrete or grout must be  $f_c=4,000$  psi and be verified by the cube strength test. The strength must be confirmed by Schmidt hammering of the pads.

Prior to placing the grout, the contact surface must be thoroughly cleaned, roughened, and wetted with water. The grout must be covered with burlap sacks after the initial concrete set and wetted at regular intervals until the required strength is obtained.

## **3-20 PARKING**

### **3-20.1 GENERAL**

Off street parking lots must be constructed in conformance with Standard Details 364 and 365. Wider aisle widths may be required if multiple utility lines are located within the aisle corridor.

### **3-20.2 CONSTRUCTION**

The City construction inspector must inspect all parking lot construction for conformance to approved plans for size, layout, drainage control, and structural section.

The minimum acceptable structural section for parking lots must be 4 inches of HMA placed over 4 inches of crushed surfacing top course, or PHMA in accordance with WSDOT Local Agencies GSPs – Divisions 2-9, unless otherwise approved by the Public Works Director. Heavier pavement sections may be required for truck traffic, vehicle storage, or as determined by the Developer's soils engineer due to soil conditions.

Prior to placing any surfacing material on the roadway, the Developer must provide density test reports certified by a professional engineer or testing laboratory registered in the state of Washington.

Crushed surfacing top course must be compacted to 95 percent maximum density. Density testing for asphalt pavement, including the necessity and frequency of core samples, will be determined by the City construction inspector on a case by case basis.

### **3-20.3 ACCESSIBILITY REQUIREMENTS**

Accessible parking stalls must meet the requirements of RCW 19.27, State building code and ANSI 117.1. Refer to BMC 12 Zoning. Safe, convenient, wheelchair access is required from the street to all buildings on site. This is in addition to safe, convenient wheelchair access between buildings. Sidewalks constructed adjacent to City streets/roadways must provide wheelchair access, including ramps, landings, and handrails as necessary.

### **3-20.4 ILLUMINATION**

Illumination must be provided for parking lots having more than 10 parking spaces, and must:

1. Provide adequate illumination for security and safety to all parking spaces, pedestrian walkways, and sidewalks. Driveway entries and exits should have special illumination and signage, where necessary. Pedestrian scale lighting may be required to illuminate pedestrian trails, paths, and walkways consistent with the policies of the Imagine Bothell...Comprehensive Plan.
2. Be shielded in a manner that does not disturb residential uses or public rights-of-way adjacent to the parking facility.

### **3-20.5 PEDESTRIAN CONCERNS**

Pedestrian walkways and sidewalks must conform to requirements of the BMC 12 Zoning.

Internal vehicle and pedestrian circulation for parking lots must be approved by Public Works Director. Parking lots must provide pedestrian paths that are physically separated from vehicle traffic and maneuvering area so that pedestrians and wheelchairs can easily gain access from

public sidewalks and bus stops to building entrances. In shopping center parking lots with more than 100 spaces, pedestrian/wheelchair paths must be a minimum of 5 feet wide and constructed so that they cannot be used as a holding area for shopping carts.

Access driveways for parking areas must be located to cause the least possible conflict with vehicular and pedestrian traffic on public rights-of-way.

The Public Works Director may require joint use of driveways by more than one property to minimize pedestrian/vehicle conflicts.

## **3-21 LANDSCAPING**

Landscaping must conform to BMC 12.18 Tree Retention and Landscaping.

### **3-21.1 PURPOSE**

The purpose and intent of this section is to provide minimum landscape development and buffering requirements in order to maintain and protect property values, enhance the appearance of the development, protect the aesthetic assets of the community, provide screening between incompatible land uses, reduce erosion and storm-water runoff, provide surfaces for natural groundwater surcharge and promote energy conservation.

### **3-21.2 IMPLEMENTATION**

The Developer may use plant materials on the adopted plant lists or may use other plant materials, as approved by the Community Development Department. The City may require the Developer to modify a plant choice to provide:

1. Desired diversity of species.
2. Plantings more in scale and comparable with the uses in the immediate vicinity of the property.
3. Plant materials that will fulfill the buffering or landscaping purpose on a year-around basis.

The City may require additional landscaping where it is deemed necessary to screen or buffer the development from its surroundings, or to comply with the spirit of the landscape zoning code.

### 3-21.3 ADOPTED PLANT LISTS

APPROVED STREET TREES				
LARGE TREES		AT MATURITY		
Scientific Name	Common Name	Min. Strip Width	Height	Spread
Acer nigrum 'Greencolumn'	GREENCOLUMN MAPLE	5'	50'	25'
Acer platanoides 'Emerald Queen'	EMERALD QUEEN NORWAY MAPLE	5'	50'	40'
Acer pseudoplatanus	SYCAMORE MAPLE	5'	50'	35'
Acer saccharum	SUGAR MAPLE	5'	50'	40'
Acer saccharum 'Barrett Cole'	APOLLO SUGAR MAPLE	5'	50'	25'
Fagus sylvatica 'Fastigiata'	FASTIGIATE EUROPEAN BEECH	6'	50'	20'
Liquidambar styraciflua	AMERICAN SWEETGUM	8'	50'	30'
Quercus alba	WHITE OAK	5'	60'	45'
Quercus robur	ENGLISH OAK	6'	60'	40'
Quercus rubra	RED OAK	6'	60'	45'
Quercus coccinea	SCARLET OAK	5'	60'	40'
Tilia americana 'Redmond'	REDMOND LINDEN	6'	50'	30'
Tilia cordata	LITTLELEAF LINDEN	5'	50'	30'
Ulmus 'Frontier'	FRONTIER ELM (FOR MULTIWAY BOULEVARD AND CROSSROADS)	5'	50'	35'
Ulmus 'Morton Glossy' (Triumph)	TRIUMPH ELM	5'	50'	35'



MEDIUM TREES		AT MATURITY		
Scientific Name	Common Name	Min. Strip Width	Height	Spread
Acer platanoides 'Parkway'	PARKWAY NORWAY MAPLE	5'	40'	30'
Acer rubrum 'Armstrong'	ARMSTRONG RED MAPLE	5'	45'	15'
Acer rubrum 'Columnare'	COLUMNAR RED MAPLE	5'	45'	15'
Acer rubrum 'October Glory'	OCTOBER GLORY RED MAPLE	5'	45'	35'
Acer rubrum 'Red Sunset' or Acer rubrum 'Franksred'	RED SUNSET MAPLE	5'	45'	35'
Carpinus betulus	EUROPEAN HORNBEAM	4'	40'	30'
Carpinus betulus 'Fastigiata'	FASTIGIATE EUROPEAN HORNBEAM	4'	40'	15'
Carpinus betulus 'Pyramidalis'	PYRAMIDAL EUROPEAN HORNBEAM	4'	40'	15'
Carpinus betulus 'Franz Fontaine'	FRANZ FONTAINE HORNBEAM	4'	40'	15'
Cercidiphyllum japonicum	KATSURA TREE (FOR MAIN STREET ASCENT)	6'	40'	30'
Fagus sylvatica 'Dawyck Purple'	DAWYCK PURPLE BEECH	6'	40'	12'
Fraxinus pennsylvanica 'Summit'	SUMMIT ASH	5'	45'	35'
Ginkgo biloba 'Autumn Gold'	AUTUMN GOLD GINKGO (FOR MAIN STREET)	5'	45'	30'
Ginkgo biloba 'Princeton Sentry'	PRINCETON SENTRY GINKGO	5'	45'	20'
Prunus sargentii 'Columnaris'	COLUMNAR SARGENT CHERRY	8'	35'	15'
Pyrus calleryana 'Chanticleer'	COLUMNAR PEAR	5'	40'	20'
Pyrus calleryana 'Aristocrat'	ARISTOCRAT FLOWERING PEAR	5'	40'	20'
Zelkova serrata 'Musashino'	MUSASHINO COLUMNAR ZELKOVA	6'	40'	15'
Zelkova serrata 'Village Green'	VILLAGE GREEN ZELKOVA	6'	40'	40'

SMALL TREES			AT MATURITY	
Scientific Name	Common Name	Min. Strip Width	Height	Spread
Amelanchier x grandiflora 'Autumn Brilliance'	AUTUMN BRILLIANCE SERVICEBERRY	4'	20'	15'
Cercis Canadensis	EASTERN REDBUD	5'	25'	30'
Fagus sylvatica 'Tricolor'	TRICOLOR EUROPEAN BEECH	4'	30'	20'
Magnolia 'Galaxy'	GALAXY MAGNOLIA	5'	25'	25'
Sorbus aucuparia	EUROPEAN MOUNTAIN ASH	5'	30'	20'
Stewartia monodelpha	TALL STEWARTIA	5'	30'	20'
Styrax japonica	JAPANESE SNOWBELL	5'	25'	25'
Styrax obassia	FRAGRANT SNOWBELL	5'	25'	15'

ADOPTED PLANTS FOR SPECIAL CIRCUMSTANCES			
DROUGHT TOLERANT	REVEGETATION	RIPARIAN	ORNAMENTAL
Trees	Trees	Trees	Trees
American Smoke Tree	Big Leaf Maple	Aspen	Ash
Deodar Cedar	Cal. Bay Laurel	Big Leaf Maple	Birch
Giant Sequoia	Cascara	Black Cottonwood	Cedar
Madrone	Coast Redwood	Black Hawthorn	Cherry
Maple (select species)	Cottonwood	Cal. Bay Laurel	Dogwood
Oak (select species)	Deodar Cedar	Hemlock	Elm (disease resistant)
Pine	Douglas Fir	Mountain Alder	Ginko
Silver Linden	Grand Fir	Oregon Ash	*Hawthorn
Staghorn Sumac	Hazelnut	Oregon White Oak	*Hornbeam
Strawberry Tree	Incense Cedar	Pacific Dogwood	Honeylocust
Tamarack	Linden	Red Alder	*Katsura
<b>Shrubs</b>	Mountain Ash	Shore Pine	Linden
Barberry	Oregon White Oak	Sitka Spruce	Magnolia
Cotoneaster	Pacific Dogwood	Vine Maple	*Maple
English Yew	Pacific Madrone	Western Red Cedar	*Oak
Escallonia	Quaking Aspen	White Alder	*Pear
Evergreen Huckleberry	Red Alder	<b>Shrubs</b>	Pine
Firethorn	Sequoia	Cascara	*Plum
Japanese Boxwood	Sitka Spruce	Elderberry	Redbud
Lilac Spp.	Staghorn Sumac	Gooseberry	Redwood
Mock Orange	Vine Maple	Hackberry	Spruce
Mugho Pine	Western Hemlock	Mock Orange	Sweet Gum
Ninebark 'Darks Gold'	Western Red Cedar	Ninebark	*Zelkova
Portugal Laurel	Wild Cherry	Ocean Spray	<b>Shrubs</b>
Potentilla	<b>Shrubs</b>	Red Elderberry	Abelia
Pyracantha	Cinquefoil	Red Twig Dogwood	Azalea

Rock Rose	Dwarf Tanbark	Salmonberry	Barberry
Rugosa Rose	Elderberry	Serviceberry	Dogwood
Spirea Spp.	Gooseberry	Snowberry	Enkianthus
Yucca	Mock Orange	Spirea	Euonymous
Wild Rose	Oregon Grape	Wild Rose	Hebe
Winter Blooming Camellia	Pacific Rhododendron	Willow (several species)	Holly
<b>Groundcovers</b>	Red Huckleberry	<b>Groundcovers</b>	Juniper
Ceanothus	Red Twig Dogwood	Clover (select species)	Laurel
Creeping Mahonia	Serviceberry	Creeping Oregon Grape	Lilac
Juniper (select species)	<b>Groundcovers</b>	Ferns (select species)	Mexican Orange
Kinnikinnik	Dwarf Dogwood	Grasses (select species)	Pacific Myrtle
St. Johns Wort	English Ivy	Salal	Photinia
	Kinnikinnik		Pieris
	Mountain Heathers		Potentilla
	Oregon Grape		Privet
	Rubus spp.		Quince
	Salal		Rhododendron
	Starflower		Rock Rose
	Wild Strawberry		Sarcococca
	Wildflower Meadow Mix		Skimmia
	Wintergreen		Strawberry Shrub
			Viburnum
			<b>Groundcovers</b>
			AjugaPachysandra
			Carpet Heather
			Cotoneaster
			Honeysuckle
			Pt. Reyes Ceanothus
			St. Johns Wort
			Vinca

\*Recommended Street Trees

### 3-21.4 WETLAND PLANTS

Native wetland plants are preferred for wetland areas. Plant materials as identified by Ecology and the Washington State Department of Fish & Wildlife must be used. Invasive species such as Purple Loose Strife or Reed Canary Grass are not allowed.

# Chapter 4

## STORM DRAINAGE



City of Bothell™

## DESIGN AND CONSTRUCTION

## STANDARDS AND SPECIFICATIONS 2019

### Sections

#### 4-1 General Requirements

- 4-1.1 Applicability
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## 4-1 GENERAL REQUIREMENTS

The City of Bothell storm drainage utility service area includes the area within City of Bothell city limits. The storm drainage utility is implemented in accordance with BMC 18.04 and 18.10, and the National Pollution Discharge Elimination System (NPDES) Phase II Permit.

The purpose of this chapter to provide for and promote the health, safety, and welfare of the general public through sound development policies and construction procedures which respect and preserve the City's storm drainage and watercourses; to minimize water quality degradation and control of sedimentation of creeks, streams, ponds, lakes, and other water bodies; to preserve and enhance the suitability of waters for recreation and fish habitat; to preserve and enhance the aesthetic quality of the waters; to maintain and protect valuable groundwater quantities, locations, and flow patterns; to ensure the safety of City roads and rights-of-way; and to decrease drainage-related damages to public and private property.

Design and construction of storm drainage systems must conform to the Bothell Standards, the Bothell Surface Water Design Manual (Appendix B), the NPDES Phase II Permit and associated Technical Appendices, and the WSDOT Highway Runoff Manual. If inconsistencies occur, the Bothell Standards will have precedence.

The City encourages the use of LID storm drainage features and will encourage LID implementation as part of Capital Projects and new public and private developments. LID designs will be reviewed on a case-by-case in accordance with the Bothell Surface Water Design Manual and Technical Appendix 1 of the NPDES Phase II Permit. LID infiltration and dispersion measures must be designed with regard to minimizing potential property impacts.

Storm drainage system improvements will be required when the existing collection and conveyance system is not adequate for increased proposed use because of on-site or off-site inadequacy including, but are not limited to, age, pipe diameter, type, slope, and roughness. All storm drainage improvements must be completed in general accordance with the City's Surface and stormwater Comprehensive Plan. The improvements must extend from the project to the point the Public Works Director deems the system reliable. The improvements must be consistent with the Bothell Standards for new construction and must be approved by the Public Works Director.

All storm drainage systems owned and/or maintained by the City of Bothell outside of the right-of-way must be in a tract or easement granted to the City (see 1-9.3). All privately owned and maintained storm drainage systems must include covenants and restrictions requiring annual system maintenance by the owner, annual inspection and reporting to the City by the owner, and access easements for City inspection for facilities located outside of the right-of-way.

All materials must be new and undamaged. The manufacturer of an item used throughout the work must be the same and as approved during the submittal review process prior to construction unless otherwise approved by the Public Works Director. Storm drainage systems, and associated pavement restoration and/or other associated mitigation and repair, must extend to the nearest downstream connection as required by the Public Works Director.

No willows, poplars, cottonwoods, birches, soft maple, gum, or any other tree or shrub whose roots are likely to obstruct stormwater functions are allowed within 30 feet of any stormwater pipes or facilities in accordance with BMC 18.04.150. Any of these trees found to be located within 30 feet of a proposed stormwater pipes or facilities must be removed at the Developer's expense. Any of these trees planted or established within 30 feet of constructed stormwater pipes or facilities must be removed by the property owner or owners association.

The standards established by this chapter are intended to represent the minimum design standards for the construction of storm drainage facilities. Compliance with these Standards does not relieve the designer of the responsibility to apply conservative and sound professional judgment to protect the health, safety, and welfare of the general public. Special site conditions and environmental constraints may require a greater level of protection than would normally be required under these Standards. The designer must apply these Standards bearing in mind these constraints. Developers must be licensed, bonded, and experienced in the field of work being performed.

#### **4-1.1 APPLICABILITY**

All persons taking the following actions or applying for any of the following permits and/or approvals may be required to submit for approval a stormwater plan with their application and/or request:

1. New development;
2. Redevelopment;
3. Building permit;
4. Subdivision or Short subdivision approval;
5. Commercial, industrial, or multifamily site plan approval;
6. Planned unit development or Master Plan Development;
7. Conditional use permits, Site Plan Review permits;
8. Substantial development permit required under RCW 90.58 (Shoreline Management Act);
9. Right-of-Way use;
10. Logging, clearing, and other land disturbing activities;
11. Projects that discharge stormwater directly, or immediately adjacent, to a floodplain, stream, lake, and wetland or closed depression, erosion or landslide hazards area, or other critical area as defined by BMC 14.04.

#### **4-1.2 OWNERSHIP**

Storm drainage facilities associated with commercial or mixed-use commercial and residential development must be owned and maintained by the owner or owner's association. Storm drainage facilities associated with residential development must be privately owned and maintained by the owner or owner's association unless otherwise approved by the Public Works Director in accordance with BMC 18.04.160.

#### **4-1.3 EASEMENTS AND TRACTS**

Storm drainage easements must meet the requirements of Section 1-9.3 and must be exclusive for storm drainage facilities, unless otherwise approved by the Public Works Director. Open retention/detention ponds and infiltration facilities must not be located in dedicated public road right-of-way areas unless specifically approved by the Public Works Director. Vaults, pipes, and other underground facilities must not be located within the road travel way unless specifically approved by the Public Works Director. All storm drainage construction must be staked prior to construction to ensure placement within designated easements. All stormwater facilities dedicated to the City must be located entirely within dedicated right-of-way, tract, or approved easement.

#### **4-1.4 STORM DRAINAGE DESIGN**

All proposed public and private storm drainage systems must be designed, signed, and stamped by a professional engineer, registered with the state of Washington. The design must be consistent with Imagine Bothell...Comprehensive Plan, the Bothell Surface Water Design Manual, and must be approved by the Public Works Director. The designer must meet all applicable federal, state, and local water quality standards prior to discharge to any wetland, stream, river, lake, or other critical area.

The installation of storm drainage improvements must be in accordance with the construction plans as approved by the Public Works Director for the project. Any significant changes to the approved plans are to be reviewed and approved by the Public Works Director before the changes are incorporated into the work.

#### **4-1.5 PERMITS**

In addition to the appropriate permits listed in Section 1-6, permits may be required by the Washington State Department of Fish and Wildlife, Ecology, King County, or Snohomish County. The Developer must submit copies of the approved permits to the City.

#### **4-1.6 ILLICIT DISCHARGES**

Illicit discharges to the storm drainage system, or surface water, is prohibited in accordance with BMC 18.04.400.

#### **4-1.7 MAINTENANCE**

The frequency and difficulty of future maintenance should be minimized by thorough consideration of all possible failures in the system during design and what would be required to correct the problem. Design adjustments to ease maintenance should be a major consideration.

#### **4-1.8 EMERGENCY OVERFLOW**

Emergency overflow provisions must be installed in such a manner as to direct waters away from all structures without causing failure of those structures. The impact of a system failure should be analyzed both in terms of on-site and off-site effects. Adverse impacts must be avoided with respect to adjacent properties, elements of the public drainage system or other private systems, and critical areas. Retention/detention and infiltration facility design must take into account overflows, which may result from:

1. Higher-intensity or longer-duration storms than the design storm;
2. Plugged orifices;
3. Inadequate storage due to sediment buildup;
4. Debris blockage; or
5. Other reasons causing system failure.

## 4-2 CONSTRUCTION PLANS

1. See Section 1-9 for construction plans requirements and Appendix C for required Standard Notes on Plans.
2. Storm drainage facilities must be designed and constructed in accordance with an approved Technical Information Report that addresses all Core Requirements, LID evaluation as summarized in Technical Appendix 1 of the NPDES Phase II Permit for Western Washington, or as otherwise required by the Bothell Surface Water Design Manual.
3. All on-site and off-site improvements must be shown. Existing and proposed improvements, included in half tone background to show their relative locations, must be depicted including sewer, water, roadway, streetlight, and landscape construction. Include elevations of sewer mains, water mains, storm drainage, and any other utilities at all crossings.
4. Plans must show existing and proposed easements where facilities are on private property. All easements must be a minimum of 15 feet wide unless otherwise approved by the Public Works Director. All easements must be executed prior to final construction approval.
5. Before any construction begins, the Developer must complete a pre-construction meeting and provide the City with the name and contact information for the person in charge who can be contacted 24 hours a day regarding construction-related problems.
6. All stormwater drainage pipe must be designed and constructed to provide gravity flow for drainage associated with the project, include depth and capacity for proposed upstream development, and be located at a depth of at least two feet below the ground surface. Minimum required velocity for full pipe flow is three (3) feet per second, minimum required 2 percent slope for 6 inch diameter pipe, 1percent slope for eight (8) inch diameter pipe, and 0.5 percent slope for 12 inch and greater diameter pipe.
7. All storm drainage pipe within the right-of-way, and/or connecting to Type 1 or Type 2 catch basins or stormwater detention/water quality facilities, must be minimum 12-inch diameter Polyvinyl Chloride (PVC) ASTM D-3034 SRD-35 pipe. Storm drainage pipe located at a depth of less than two feet must be Class 52 Ductile Iron meeting water system requirements as summarized in Chapter 5-6.2.
8. Storm drainage pipe from 18 to 24 inches in diameter must be PVC ASTM F-679 SDR-35 pipe and storm drainage pipe greater than 24 inches in diameter will be reviewed on a case-by-case basis. No drainage pipe must be allowed at a depth of less than 12 inches below the ground surface. Aboveground conveyance must be approved by the Public Works Director and must be minimum High Density Polyethylene Pipe (HDPE) SDR-11 with an approved engineered anchoring system.
9. Corrugated metal pipe detention tanks, culverts, and other improvements are not allowed unless approved by the Public Works Director.
10. Black vinyl-coated chain link fence must be provided around all pond facilities. The fence must be six (6) feet high, include top-rail construction, and include vehicle and worker access gates.
11. A copy of approved construction plans must be on site during all phases of construction.
12. All new pipe connections must extend to the nearest off-site catch basin unless otherwise allowed by the Public Works Director. Pipe cut-in, patching, and banding is not allowed.
13. General Notes for Storm Drainage and Temporary Erosion and Sediment Control Plans (Appendix C) must be incorporated into Construction Drawings.



## **4-3 EXISTING UTILITIES**

The Developer must investigate and locate all buried utilities or obstructions within the construction area prior to the installation of new facilities. The Developer must establish the field locations of the existing facilities such as water, sewer, storm drain, power, telephone, cable television, gas, and all other affected utilities.

The Developer must call for utility locates 1-800-424-5555 (or 811) a minimum of 48 hours before any excavation occurs. All services must be located before any excavation occurs.

## **4-4 TRENCH EXCAVATION, BEDDING AND BACKFILL FOR STORMWATER PIPE**

### **4-4.1 SECTION DESCRIPTION**

This work must consist of excavating, bedding, and backfilling for stormwater pipe and appurtenances for both temporary and permanent installation under ordinary conditions.

### **4-4.2 GENERAL REQUIREMENTS**

A Qualified Person must be involved in planning and having a safe excavation project in accordance with Part N: Excavation, Trenching, and Shoring (WAC 296-155). Material excavated from trenches and piled adjacent to the trench, along a roadway, must be piled and maintained so that the toe of the slope of the material is at least 2 feet from the top edge of the trench. Special provisions may be required of the Developer to prevent erosion of stockpile materials onto the roadway, ditches, storm system, or private property. Stockpiles must not impede public travel unless specifically approved by the Public Works Director. Flaggers, warning signs, and traffic control devices must be used to control traffic and to minimize disruptions. Free access must be maintained to fire hydrants, water valves, other utility control valves, meters, and vaults. Free access must be maintained for postal carriers. Clearance must be left to enable free flow of stormwater in gutters, other conduits, and natural watercourses. See Sections 5-7.3, 5-7.4, and 5-8.1 for additional requirements with respect to trench excavation, bedding, and dewatering.

### **4-2.3 BACKFILLING TRENCHES**

See Standard Details 470 and 471. The City construction inspector and third-party geotechnical inspector will examine excavated native material at the time of excavation to determine its suitability for use as backfill. Unsuitable backfill material must be removed from the site, disposed of, and replaced with 5/8 inch minus crushed rock, control density fill (CDF), or with gravel borrow as approved by the City construction inspector.

In backfilling the trench, the Developer must take all necessary precautions to protect the pipe from any damage or shifting. Compaction in the pipe zone must be by hand tamping or with mechanical compaction as approved by the City construction inspector, so as not to damage the pipe. The first layer of material to be compacted must be 18 inches over the top of pipe.

Trench backfill must be spread in layers and be compacted by mechanical tampers of the impact type approved by the City construction inspector. Water settling will not be permitted. After the initial 18 inches of backfill is placed, the remaining backfill material must be placed in successive layers not exceeding 1-foot in loose thickness. Each layer must be compacted as follows:

1. Streets, roadway shoulders and sidewalks must be compacted to 95 percent of maximum dry density, according to Modified Proctor.
2. Unimproved or landscaped areas must be compacted to 90 percent of maximum dry density, according to Modified Proctor.

During all phases of the backfilling operations and testing, as outlined herein, the Developer must protect the pipe installation, provide for the maintenance of traffic as may be necessary, and provide for the safety of property and persons.

## **4-5 INSPECTIONS AND APPROVAL**

### **4-5.1 CONSTRUCTION AND MAINTENANCE INSPECTIONS**

The holder of any permit that requires a drainage plan must arrange for scheduling the following inspections:

1. Temporary Erosion and Sediment Control Inspections in accordance with Standard Notes (Appendix C).
2. Initial Inspection - Whenever work on the grading, excavations, or fill is ready to commence.
3. Rough Grading - Whenever all rough grading has been completed.
4. Bury Inspection - Prior to placing bedding material and then burial of any underground drainage structure. Trench must be inspected for soft spots and consistency. A follow-up inspection will be as required by the City for compaction and lift thickness requirements
5. Finish Grading - When all work including installation of all drainage structure and other protective devices has been completed.
6. Planting - When erosion control planting shows active growth. The site may be inspected for compliance with planting requirements upon receiving such notice. The Inspector must inspect the work and will either approve the same or notify the Developer in what respects there has been failure to comply with the requirements of the approved plans. Any portion of the work which does not comply must be promptly corrected by the Developer. In addition, the City may make unscheduled site inspections to ensure compliance with any permit or approval and installation per these Standards.

### **4-5.2 FINAL APPROVAL**

The following steps must be completed before the City will approve the improvements and release the performance bond.

1. All easements must be reviewed, approved, and recorded, as per 1-9.3.
2. The drainage system must have been inspected and approved by the City construction inspector.
3. Before the City will issue final acceptance of the project, the interior of storm drainage pipes larger than 6 inches in diameter must be inspected by Closed Circuit Television (CCTV) camera and footage provided to the City in DVD format in accordance with 6-7.14.
4. The City construction inspector must have received, reviewed, and approved the as-builts as per 1-14.
5. The City must receive a satisfactory maintenance bond per 1-5.2.

# Chapter 5

## WATER DISTRIBUTION



City of Bothell™

## DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS 2019

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**5-20 Acceptance of Water Systems**

## 5-1 GENERAL REQUIREMENTS

The City of Bothell provides water service to approximately 50 percent of the city. With the exception of fire hydrant and fire sprinkler requirements contained in the standards, this section of the Bothell Standards pertains to the City's water service area only. For information on water requirements outside the City's water service area, please contact the appropriate water utility district.

All construction of water mains and related appurtenances must conform to the Bothell Standards, applicable American Water Works Association (AWWA) Standards and Section 7-09 of the latest edition of WSDOT/APWA Standard Specifications. The general requirements of AWWA and the WSDOT/APWA Standard Specifications must apply unless they are inconsistent with any of the provisions of this particular section. If inconsistencies occur, the Bothell Standards will have precedence.

The City is typically responsible for the water service from the water main to, and including the meter. The customer is responsible for all connections to and from the backside (or outlet side) of the meter, including, but not limited to, vaulted piping systems and connections, meter setter connections, and tailpiece connections (meter couplings). If the meter or piping system to the meter is equipped with an unmetered bypass arrangement, the City is responsible up to and including the hot side shut-off valve on the bypass. All connections downstream from the bypass valve are the customer's responsibility.

Any public water system, or any plumbing in a residential or nonresidential facility providing water for human consumption that is connected to a public water system, must be lead-free. With respect to solders and flux, lead-free must meet the standards of the Washington State Department of Health.

Water main extensions will be required when the property does not front on a water main. The minimum extension must be to a point at least 5 feet beyond the prolongation of the property line. The standard pipe size approved for water distribution main construction is 8, 12, and 16 inch, with a minimum size of 8 inches in diameter. The standard pipe size approved for water service line construction is one (1), 1½, two (2), four (4), and six (6) inches, with a minimum size of 1 inch in diameter.

The pipe material required for the construction of four (4), six (6), eight (8), 12, and 16 inch water pipe is CL 52 ductile iron. The pipe material required for the construction of one (1), 1½-, and two (2) inch water pipe is high-density polyethylene pipe.

Water main improvements are be required when the existing water main is not adequate for increased use proposed, (criteria used to determine adequacy include, but are not limited to, age, pipe diameter, type, and conditions of existing water main). The City's water system comprehensive plan, water main evaluation study and hydraulic analysis results are used to determine water main adequacy. The improvements must extend from the project to the point the Public Works Director deems the system reliable. The improvements must be consistent with the Bothell Standards for new construction and must be approved by the Public Works Director.

All water main extensions and new water main construction require the Developer to design and extend the water main to a point at least 5 feet beyond the farthest edge of the property, or as directed by the Public Works Director. All new water mains become City property, including necessary easements, following the City's acceptance of construction.

All City of Bothell water mains located on private property must be in an easement granted to the City (see Section 1-9.3). In some cases, the Public Works Director and the Fire Marshall may determine that a legal separation of ownership is warranted and an approved cross-connection control assembly may be required at the point of connection to the City water main.

Water main extensions and new fire hydrant installations may be required per the Fire Marshall.

All water main construction must be staked to ensure placement within designated easements. Any deviation from this requirement must be approved by the Public Works Director.

The installation of water mains and appurtenances must be in accordance with the construction plans as approved by the Public Works Director for the project. Any significant changes to the approved plans are to be reviewed and approved by the Public Works Director before the changes are incorporated into the work. Minimum pipe sections in water main construction must be no less than 3 feet in overall length.

All materials must be new and undamaged. Unless otherwise approved by the Public Works Director, the manufacturer of an item used throughout the work must be the same. Developers must furnish and install a watertight plug of the appropriate size in the end of the water main anytime work is delayed or stopped. Where water mains stop, the main must be extended past any asphalt surfaces existing or contemplated, as required by the Public Works Director.

Vault and meter boxes cannot be in a location subject to vehicle traffic.

All irrigation systems, excluding single-family residential, must be served by a dedicated irrigation metered connection, including common landscape areas in single-family residential developments. Deduct meters are not permitted.

All irrigation systems are subject to cross connection control requirements established by state and local laws and the Bothell Cross Connection Control Manual adopted by the City Council.

Developers must be licensed, bonded, and experienced in the field of work being performed.

A water main installation must be located in the center of the easement, which is to be located outside the drip line of mature trees.

#### **5-1.1 EASEMENTS**

Water main easements must meet the requirements of Section 1-9.3 and must be exclusive for the water main and appurtenances, unless otherwise approved by the Public Works Director and the Fire Marshall.

#### **5-1.2 WATER MAIN DESIGN**

All proposed water mains, additions, and improvements to the City's water system must be designed, signed, and stamped by a professional engineer, registered with the state of Washington. The design must be consistent with Imagine Bothell...Comprehensive Plan, the City of Bothell Water System Plan, and the Department of Health Water System Design Manual, and must be approved by the Public Works Director.

#### **5-1.3 PERMITS**

In addition to the appropriate permits listed in Section 1-6, permits may be required by the Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife, Ecology, King County, or Snohomish County, etc. The Developer must submit copies of the approved permits to the City.



## 5-2 CONSTRUCTION PLANS

1. See Section 1-9 for construction plans requirements and Appendix C for required Standard Notes on Plans.
2. Water and sewer plans may be combined. Other utilities must be included in half tone background to show their relative locations.
3. Plans must show existing and proposed easements where mains are on private property. All hydrants, meters, and other appurtenances must be located within the easements, which must be a minimum of 15 feet wide.
4. Easements must be executed at completion of construction. Water mains must be centered in the easement as much as possible. Access to easements must remain open for maintenance and repair. Structures and fences may not be located, nor trees and shrubs planted, on easements. Marking posts approved by the City must be noted on plans marking the centerline of easements in unpaved areas.
5. Show elevations of sewer mains, water mains, and storm drains where they cross each other. If possible, angle crossings between water mains and sanitary sewers or between water mains and storm lines should be at 90 degrees wherever possible, avoid intersection angles of less than 75 degrees.
6. A minimum of 10 feet of horizontal clearance must be maintained between water mains and sewer lines. A 5-foot horizontal clearance must be maintained between water mains and all other utilities. If the separation requirements are not possible, the Developer must design the system in accordance with practices in the most recent publication of the AWWA subject to approval by the Public Works Director.
7. There must be a minimum 18 inches vertical separation wherever a water main crosses a sanitary sewer or storm sewer, or wherever a water service crosses a sanitary side sewer or a storm line. All other utilities (including gas, power, phone, and cable) must be located a minimum of 18 inches below the water utility. Any deviation from these requirements must be approved by the Public Works Director and be consistent with the latest Department of Health Water System Design Manual.
8. Before any construction begins, the Developer must provide the City with the name and contact information for the person in charge who can be contacted 24 hours a day regarding construction-related problems.
9. Whenever a new water main or service replaces an existing water main or service, the Developer must abandon the existing main or service at a point that minimizes its overall length, and cap or plug it, typically at the point of connection. The plans must show the size and location of all existing water facilities with respect to the new connection and abatement points. Whenever a replacement water service is constructed and reconnected to an existing water meter, the service must be constructed as new, per standard details. The existing water service must be removed or disconnected at the point of connection to the City's water main, capped or plugged, and cut 1-foot below the bottom of the new meter box.
10. Whenever a leak occurs on a new section of pipe the Developer must replace the section of pipe with new. Repair bands and clamps will not be allowed on a new section of pipe. Whenever a leak occurs on a new 1-inch, 1½ inch, or 2-inch water service, the entire service must be replaced.
11. Whenever a leak or other damage occurs to an existing section of pipe/appurtenance, the Developer must make all repairs. Splices or repair band clamps on 2 inch or smaller water service piping will not be permitted within paved areas. The Developer may use no more than one repair band clamp or splice to make the repairs. When more than one repair has been made within 50 feet of the proposed repair, the Developer must replace the damaged section of pipe for a length as required to maintain a minimum 50 feet of continuous, undamaged pipe. Multiple repairs within a 50-foot section of existing pipe will not be permitted. In cases where previous repairs or multiple damages have been made on an existing water service up to 4 inches in diameter, the Developer will be required to replace the entire service, per Standard Details.

12. No domestic or irrigation services or taps may be taken from a hydrant run.
13. A copy of approved construction plans must be on site during all phases of construction.
14. Restrained joints are required for all new and replaced water main, fittings, and appurtenances.
15. Valve cans and other appurtenances or vaults with lids within the road must be located outside of the vehicle wheel path to the maximum extent practicable.
16. When an existing piece of pipe is cut out and replaced with a new section of pipe, it will be referred to as a cut-in. The length of pipe to be cut out and removed may be no less than 16 feet long. Whenever possible, the replacement pipe must consist of a continuous pipe section. The cut-in pipe section must also extend a minimum of 3 feet past a perpendicular ditch line.
17. Whenever an adjacent utility 6 inches or greater in diameter, or having displaced area of 6 inches or greater, perpendicularly crosses under an existing water main (excluding DIP), a DIP water main cut-in is required. Any deviation from this requirement must be applied for in writing to the Public Works Director prior to construction.
18. Pipe must be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. The bottom tiers of the stack must be kept off the ground with timbers, rails, or other similar supports. Pipe on succeeding tiers must be alternated by bell and plain end. Timbers 4 inches by 4 inches in size must be placed between tiers, and chocks must be placed at each end to prevent movement. For safety each size of pipe must be stacked separately. Stacking layers must be limited to the recommendations in the AWWA DIP Installation Guide.
19. A cut-in will not be permitted within 50 feet of another cut-in. Instead, a replacement water main must be constructed. The size and location of the replacement water main must be in accordance with the City's Capital Facilities Plan and Imagine Bothell...Comprehensive Plan.

## 5-3 EXISTING UTILITIES

The Developer must investigate and locate all buried utilities or obstructions within the construction area prior to the installation of new water facilities. The Developer must establish the field locations of the existing facilities such as water, sewer, storm drain, power, telephone, cable television, gas, and all other affected utilities.

The Developer must call for utility locates 1-800-424-5555 (or 811) a minimum of 48 hours before any excavation occurs. All services must be located before any excavation occurs.

### 5-3.1 REPLACING EXISTING UTILITIES AND IMPROVEMENTS

Whenever it becomes necessary in the course of construction to remove or disturb culverts, driveways, roadways, pipelines or other existing improvements, they must be replaced to a condition equal or superior to that existing before they were removed or disturbed. If it is necessary to trench through lawns, the sod must be removed and stored before trenching. After backfilling the trench, the sod must be replaced to the satisfaction of the City construction inspector. All damage to existing improvements during the construction process must be immediately repaired or restored to the satisfaction of the City construction inspector, at the Developer's expense.

In the event of conflict, the Developer must remove and restore existing catch basin connections, inlet connections, drains, side sewers, inlets, and other sewage and drainage facilities. All restoration must be constructed to the Bothell Standards. Water main pipe must be installed to clear mainline sewers and storm drains.

The Developer must ascertain the location of and protect private utilities from damage. Records of private utilities are not maintained by the City and private utilities will not be field located by City staff.

When utilities occupy the same space as a new water main, the Developer must protect existing utilities and work around them during excavating and pipe laying operations. The Developer must be responsible for all damages to the utilities due to their operation and must notify the City construction inspector and arrange for replacement of all damaged utilities.

Taps into existing mains will be made by the Developer at the Developer's expense, and inspected by the City construction inspector. Under certain conditions, as approved by the Public Works Director, City crews may install one (1) inch taps for a fee to cover materials, time and expenses, and restoration.

Whenever a property owner, Developer, or other person makes any changes to the existing conditions of a utility's structure that affects the accessibility, elevation, position, and/or orientation, the water structure must be raised to grade to meet current standards, restored, and/or modified to a condition as mandated by the Public Works Director.

Whenever a section of water pipe has been completely, physically disconnected from any and all possible connections to the City's existing water system, the pipe must be removed. The pipe may be abandoned in place if approved by the Public Works Director and all open ends of the abandoned section of water pipe are plugged by filling with Class 3000 or commercial concrete, for a minimum length of 12 inches. In no case may a section of abandoned water pipe be left connected to the existing water system. All caps and plugs must be watertight and installed with blocking. All valving

connected to a section of abandoned pipe must be closed and the valve boxes filled with sand. The valve box tops must be reset to 1-foot below finished grade.

## 5-4 REPLACEMENT WATER SERVICE CONNECTION(S)

### 1. General

Whenever a water service replaces an existing water service, the replacement service must be installed as new, in accordance with Bothell Standards. The new water service must be located back of curb, or at the edge of the public right-of-way. The final location of all meter sets must be authorized by the City. The Developer must hand hole the existing private water service(s) in order to verify existing service size and location of future connection point(s). All pigtail and private water service connections must be tested at line pressure and visually inspected by the City construction inspector.

Prior to transferring water service, the Developer must:

- Notify the City, by calling the inspection request line, 425.489.3390 three working days before the service transfer.
- Notify the private property owner/resident, using door hangers, two working days prior to service transfer.
- Flush all new water service piping for a sufficient amount of time to purge debris and air. Notify the City, by calling the inspection request line, prior to flushing.
- Check water meter for any water usage prior to interrupting service - a running meter may indicate an existing failed condition within the customer's private plumbing system. If this is the case, the Developer must notify the City construction inspector and postpone the service transfer until the issue can be resolved.
- Transfer one meter at a time under the construction inspector's supervision.
- Hook-up service - if supplied with an additional shut-off, the Developer must test the shut-off and call for a City inspection of the connections prior to back-fill.

### 2. Typical Connections (pigtail connection):

"Typical Connections" must apply in all cases in which the replacement water service is to be located parallel to the existing water service piping. The new meter box/set must be set back of curb or at the edge of the public right-of-way. A tailpiece section must be constructed from the private property side of the replacement meter set and must extend a minimum of 2 feet past the private property side of the old existing meter box - unless otherwise specified. The tailpiece section must be constructed of 200-psi class High Density Polyethylene pipe and be no less than 4 feet in overall length. The tailpiece section must be of similar size as the existing piping system and in no case less than 1 inch in diameter. The tailpiece section must be installed so that the orientation of the pipe section is continuous and maintains the most direct alignment as possible with the existing service piping. The transition from the new tailpiece section to the old, existing piping must be made with a compression type transition coupling resistive to electrolysis. The meter side of the tailpiece section must be constructed of all brass, adapting the pipe section with insta-tite or tighten to fit compression-style fittings.

### 3. Special Connections:

"Special Connections" must apply in all cases in which the replacement water service is to be constructed in a location that does not parallel the old, existing water service. This type of connection requires a minimum of one (1) inch water service piping and must be installed from the private property side of the new meter set to a point that is a minimum of five (5) feet from where the existing plumbing enters the building structure. The private side water service must be installed so that the orientation of the pipe section is continuous and maintains the most direct alignment as possible, with consideration to irrigation systems, landscaping, trees, shrubbery, utilities, or other structures. Removal of any landscaping, trees, and shrubbery must be authorized by the property owner and resident prior to installation.

The transition point from the new water service piping and the existing service piping must be made with a compression-type transition coupling, resistive to electrolysis. The connection to the private property side of the meter must be constructed of all brass fittings, adapting to the new pipe with insta-tite or tighten to fit compression style fittings. An all brass ball valve with operating nut must be installed on all new or replacement water service piping and located 1 to two (2) feet from the end of the new pipe, or from the point where the transition coupling is to be installed. The ball valve must be installed within a six (6) to nine (9) inch round econo box with green lid, set to grade.

The criteria used in selecting specific pipe materials for private service piping replacement is customer preference and soil conditions. The construction drawings must indicate whether to use 1inch Type K Copper Tubing or one (1) inch 200 psi Class High Density Polyethylene.

## 5-5 BACKFLOW PREVENTION

All connections must be examined and evaluated to determine if they constitute an actual or potential cross connection. Cross connections are not allowed and must be controlled by an approved back flow prevention assembly. Pressure and spill resistant vacuum breakers, double check valve assemblies, and reduced pressure backflow assemblies must be tested by a state certified Backflow Assembly Tester upon installation, annually, and when moved and/or repaired.

The following table lists the Bothell Water Section's minimum premise isolation cross control requirements. Premise isolation is mandatory for, but not limited to, the facilities/services listed below.

<b>Facilities or Service Type</b>	<b>Minimum Requirements</b>
Commercial/government facilities	Air gap or RPBA
Commercial/government facilities (Non-hazardous process or equipment within facility)	RPBA
Wastewater facilities	Air gap or RPBA plus air gap on process
Multifamily	DCVA
Fire sprinkler systems (non-chemical)	DCDA or dedicated metered connection with DCVA
Fire sprinkler systems (chemical addition)	RPDA or dedicated metered connection with RPBA
Mobile home parks (with low risk occupancy)	DCVA
Lawn irrigation system (without chemical addition)	DCVA
Lawn irrigation system (with chemical addition)	RPBA
Facilities or sites served by alternate water source (i.e., wells and springs)	RPBA
Residential single family domestic water services – suspect high hazard use, i.e., manufacturing of drugs, other source water supplying property or unknown/complex plumbing system)	RPBA

All assemblies installed for the purpose of isolating the premise through a metered connection must be installed within 12 to 24 inches of the customer's metered connection. All assemblies installed for the purpose of isolating the premise through a non-metered connection must be installed at the edge of the public right-of-way or at the edge of the waterline easement.

To prevent contaminated water in the new main from entering the existing distribution system when filling the line for testing, a hydrant meter make-up double check valve assembly must be used on the line supplying the water. A double check valve assembly is sufficient backflow protection only for filling and flushing of the new main. During the hydrostatic pressure test, the temporary connection between the new main and the existing distribution system must be removed.

Fire and irrigation or other services, as determined by the Public Works Director, must have the minimum level of backflow prevention required by the City. Fire services must have a minimum of a double check detector assembly listed for fire sprinkler use. Air gaps and reduced pressure backflow assemblies are required wherever a potential health or an unknown hazard exists. The air gap separation must be at least double the diameter of the supply pipe, measured vertically above the flow level rim of the vessel. In no case must the gap be less than 1 inch.

All connections to fire hydrants for construction related purposes must have as a minimum, Washington State Health Department approved hydrant meter make-up double check valve assemblies which are in good working order. A higher class of backflow prevention assembly may be required if the Public Works Director determines that a higher potential risk exists. The Fire Department must be consulted when hydrant connection exceeds one day. A current test report, no longer than three months old, must be provided for hydrant use meter make-ups not rented from the City.

The cross connection control assembly chosen for installation, must be on the most recent Washington State Health Department approval listing. All installations must meet manufacturer's specifications, and the minimum standards of the uniform plumbing code. No physical connections from the public potable water supply to the sanitary sewer system will be permitted.

The City of Bothell's backflow prevention program is based on BMC 18.07, Cross Connections to the City's Water System, WAC 246-290-490 and Bothell Ordinance 1634. All cross connection control requirements must be consistent with the requirements as outlined in the Bothell Cross Connection Control Manual, adopted by the City Council.

A Reduced Pressure Principle Backflow Assembly, when required, must be installed with a minimum of 12 inches between the lowest point of assembly and the top of concrete pad.

See 5-13 for fire sprinkler system requirements.



## 5-6 PIPE AND FITTINGS FOR WATER MAINS

### 5-6.1 SECTION DESCRIPTION

The work included in the following sections must apply to the construction of water distribution and transmission mains and appurtenances for both temporary and permanent installations.

### 5-6.2 MATERIALS

All water main distribution piping must be cement mortar lined ductile iron pipe conforming to AWWA C-150 and C-151 or latest revision thickness Class-52. Cement mortar lining and seal coating must conform to AWWA C-104 or latest revision.

All pipe must be carefully handled and laid according to the manufacturer's recommendations. Pipe must be checked on delivery and before placing in the trench. Pipe must be carefully bedded, joined, and protected. It must be laid on the alignment and grade shown on the plans. At all times the interior must be kept dry and free from dirt, gravel, and all other foreign matter. The open ends must be plugged and secured at all times with watertight plugs.

Prior to making any restorations or permanent connections, the Developer must first demonstrate to the City that the new water main has passed a hydrostatic pressure test, been adequately flushed, and has passed the required bacteriological tests. Pressure testing must be performed with service lines installed, up to the meter connection.

### 5-6.3 JOINTS AND FITTINGS

Rubber gasket pipe joints must be restrained push-on joint or mechanical joint (MJ) in accordance with AWWA C-111, unless otherwise specified. Flanged joints must conform to AWWA Standard C-115. Fittings must be in accordance with AWWA C-110 or AWWA C-153, latest revision.

Bolts on mechanical joints and fittings must be tightened uniformly with a torque wrench that measures the torque applied. The torque for mechanical joints must be as follows:

Pipe Diameter inches	Bolt Size inches	Range of Torque feet per lbs. recommended in AWWA C-111, page 15 of Appendix A)
3	5/8	45-60
4 to 24	3/4	75-90
30 to 36	1	100-120

Nuts spaced 180 degrees apart must be tightened alternately in order to produce equal pressure on all parts of the gland.

Set screws on retained glands must be torqued to manufacturer's specifications.

Bolts for fittings and joints must be low alloy steel or as approved by the Public Works Director.

Ductile iron fittings must be short body for a minimum pressure rating of 150 psi. Metal thickness and manufacturing process must conform to applicable portions AWWA Standards C-110 or C-153. All fittings must be cement lined per AWWA Standard C-104.

All fittings and pipe must be restrained joint unless otherwise approved by the Public Works Director. Restrained joints must be used in the construction of:

- Fire hydrant and fire sprinkler lines.
- Vertical bends.
- Re-routing existing pipelines.
- Pipelines installed on 10 percent or steeper slopes.
- Pipelines installed in unstable soils.
- Pipelines installed within casings.
- Pipelines installed on bridges.
- Horizontal bends installed within 10 feet of an existing mainline connection.

Meg-a-Lugs, or approved equal, must be used for restraining a mechanical joint connection. Grip-lock gaskets, or approved equal, must be used for restraining pipe segments.

The abandonment of a water main/line requires the main to be cut, capped (or plugged), and, typically, left in place. All valves located on the abandoned main are to be shut off. All valve boxes, hydrants, and related appurtenances must be removed. All valving which separates the live main from the abandoned main must be shut off and capped (or plugged).

## **5-7 TRENCH EXCAVATION, BEDDING AND BACKFILL FOR WATER MAINS**

### **5-7.1 SECTION DESCRIPTION**

This work must consist of excavating, bedding, and backfilling for water mains and appurtenances for both temporary and permanent installation under ordinary conditions.

### **5-7.2 GENERAL REQUIREMENTS**

A Qualified Person must be involved in planning and having a safe excavation project in accordance with Part N: Excavation, Trenching, and Shoring (WAC 296-155). Material excavated from trenches and piled adjacent to the trench, along a roadway, must be piled and maintained so that the toe of the slope of the material is at least 2 feet from the top edge of the trench. Special provisions may be required of the Developer to prevent erosion of stockpile materials onto the roadway, ditches, storm system, or private property. Stockpiles must not impede public travel unless specifically approved by the Public Works Director. Flaggers, warning signs, and traffic control devices must be used to control traffic and to minimize disruptions. Free access must be maintained to fire hydrants, water valves, other utility control valves, meters, and vaults. Free access must be maintained for postal carriers. Clearance must be left to enable free flow of stormwater in gutters, other conduits, and natural watercourses.

### **5-7.3 GRADE AND ALIGNMENT**

Prior to any pavement cutting or removal, or excavation for pipe laying, the Developer must verify with the City construction inspector, the locations and depths of the existing water main at the points where connections are to be made. The Developer must verify the dimensions, type, and condition of the existing water main. The profile must be adjusted so neither a high spot nor a low spot is created adjacent to the connection to the existing water mains.

Water mains must have and maintain a 5-foot minimum unobstructed horizontal access from plantings and other structures. Any modifications in the water main's alignment which cause the water main to be located within 2 feet of the easement boundary may require an easement adjustment, as determined by the Public Works Director. This separation must include and not be limited to sidewalks, trees, plantings, fences. Rockeries and retaining walls may require further separation and special engineering design, which must be reviewed and approved by the Public Works Director. The City will not be held responsible for damages to plantings and/or other structures that violate these separation requirements and/or limit accessibility to public easements and rights-of-way.

All water mains smaller than 12 inches in diameter must maintain a minimum cover of 36 inches and a maximum cover of 48 inches from the top of the water main to the finished grade. All water mains 12 inches in diameter and larger must maintain a minimum cover of 42 inches and a maximum cover of 60 inches from the top of the water main to the finished grade. Minimum and maximum depths must be from finish grades and must be adhered to unless otherwise approved by the Public Works Director in writing. The water line and hydrants must be installed by line and grade information as supplied by a survey.

Prior to installing the new water main, the Developer must pothole from the point of connection to the existing water main to determine line and grade. The Developer must lay the pipe such that the

final connection can be completed with less than one full stick of pipe. Bends are not allowed to obtain line and grade to the existing water main. The Developer must determine the exact location and ascertain the exact size and type of the existing facilities prior to starting work on each connection.

Prior to installing a new vaulted pipe system, proper grade and alignment must be determined and provided to and approved by the City in order to meet the clearance requirements of the piping system within the vault. All adjustments to grade and alignment must be performed outside of the vault, this could require the use of restrained joint bends when connecting to existing water mains. If so, the Public Works Director must approve this modification.

## **5-7.4 TRENCH EXCAVATION**

### **5-7.4.1 General**

Where trench excavation equals or exceeds a depth of 4 feet, the Developer must provide, construct, maintain, and remove, as required, safety systems that meet the requirements of the Washington Industrial Safety and Health Act, RCW 49.17, including WAC 296-155. The trench safety systems must be designed by a qualified person, and meet accepted engineering requirements (see WAC 296-155-650-66411).

The Developer must perform all excavation of every description and of whatever materials encountered. All excavations must be made by open cut, unless otherwise approved. The bottom of trenches must be accurately graded to provide uniform bearing and support for each length of pipe on undisturbed or compacted soil at every point along its entire length, except at joints.

Bell holes must be excavated to the extent necessary to permit accurate work in making and inspecting the joints. The Developer is responsible for trench safety as required by state and federal laws. The Developer should excavate the trench as nearly vertical as soil conditions and safety to personnel and nearby structures allow. The Developer must provide and install sheeting where depth of soil and conditions warrant.

### **5-7.4.2 Trench Widths**

The minimum and maximum trench widths for water main installation must be as described in Standard Details 534 and 535.

### **5-7.4.3 Cribbing and Sheeting-Shoring**

The Developer must adequately shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe working conditions in the trench. The method of shoring must be according to the Developer's design. The Developer may elect to use a combination of shoring and over-break, tunneling, boring, sliding trench shields, or other methods of accomplishing the work, provided the method meets all applicable local, state, and federal safety codes. Damages resulting from improper cribbing or from failure to crib is the sole responsibility of the Developer. The Developer must provide a qualified person on-site, to oversee the construction process during all shoring operations.

#### **5-7.4.4 Unsuitable Material and Polyethylene Encasement**

Whenever the native material in the bottom of the water main trench is peat, soft clay, quicksand, or other unsuitable material for pipe support, it must be removed from the trench and replaced by Foundation Material Class A which is defined as following:

<b>Sieve Size (in Inches)</b>	<b>Percent Passing</b>
2- <sup>1</sup> / <sub>2</sub>	98-100
2	92-100
1- <sup>1</sup> / <sub>2</sub>	72-87
1- <sup>1</sup> / <sub>4</sub>	58-75
<sup>3</sup> / <sub>4</sub>	27-47
<sup>3</sup> / <sub>8</sub>	3-14
U.S. No. 4	0-1

Stockpiling of unsuitable material on the project site will not be allowed. All unsuitable material must be loaded directly into trucks and hauled to a waste site obtained by the Developer.

In areas underlain by peat or other corrosive soil, all ductile iron water mains and associated fittings, including taps, and corporation stops, must be wrapped with 8 mil. polyethylene sleeves and taped in accordance with AWWA Standard C-105, unless otherwise approved by the Public Works Director.

#### **5-7.4.5 Bedding The Pipe**

The bedding or pipe zone is defined as 6 inches of crushed rock below and around the pipe to the top of the pipe. Pipe bedding must be graded smooth and mechanically compacted within the trench prior to pipe placement. Bedding along the sides of the pipe must be “knifed” into haunch and around bells and fittings. See Standard Details 534 and 535.

#### **5-7.4.6 Backfilling Trenches**

See Standard Details 470 and 471. The City construction inspector will examine excavated native material at the time of excavation to determine its suitability for use as backfill. Unsuitable backfill material must be removed from the site, disposed of, and replaced with either 5/8 inch minus crushed rock, control density fill (CDF), or with gravel borrow as approved by the City construction inspector.

In backfilling the trench, the Developer must take all necessary precautions to protect the pipe from any damage or shifting. Compaction in the pipe zone must be by hand tamping or with mechanical compaction as approved by the City construction inspector, so as not to damage either the exterior of the pipe or the pipe’s cement mortar lining. The first layer of material to be compacted must be 18 inches over the top of pipe.

During all phases of the backfilling operations and testing, as outlined herein, the Developer must protect the pipe installation, provide for the maintenance of traffic as may be necessary, and provide for the safety of property and persons.

#### **5-7.4.7      Compaction Of Backfill**

Trench backfill must be spread in layers and be compacted by mechanical tampers of the impact type approved by the City construction inspector. Water settling will not be permitted. After the initial 18 inches of backfill is placed, the remaining backfill material must be placed in successive layers not exceeding 1-foot in loose thickness. Each layer must be compacted as follows:

1. Streets, roadway shoulders and sidewalks must be compacted to 95 percent of maximum dry density, according to Modified Proctor.
2. Unimproved or landscaped areas must be compacted to 90 percent of maximum dry density, according to Modified Proctor.

## 5-8 CONSTRUCTION REQUIREMENTS

### 5-8.1 TRENCH DEWATERING

Where water is encountered in the trench, it must be removed during pipe-laying operations and the trench maintained until the ends of the pipe are sealed and provisions are made to prevent floating of the pipe. Trench water or other deleterious materials must not be allowed to enter the pipe at any time.

### 5-8.2 HANDLING PIPE

All pipe must be handled in a manner to prevent damage to the pipe, pipe lining, or coating. Pipe and fittings must be loaded and unloaded using hoists and slings in a manner to avoid shock or damage. Under no circumstances must they be dropped, skidded, or rolled against other pipe. Damaged pipe will be rejected, and the Developer must immediately place all damaged pipe apart from the undamaged and must remove the damaged pipe from the site within 24 hours.

Methods of pipe handling must be corrected by the Developer if the City construction inspector determines that these methods are damaging the pipe.

Dirt or other foreign material must be prevented from entering the pipe or pipe joint during handling or laying operations. Any pipe or fitting that has been installed with dirt or foreign material in it must be removed, cleaned, and re-laid. A clean whisk broom must be used for this purpose and for brushing to remove foreign matter prior to joining of pipe ends. At times when pipe laying is not in progress, the open ends of the pipe must be closed by a watertight plug.

Pipe must be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. Pipe ends must be plugged or covered before installation by either factory installed plugs or by being wrapped in plastic. The bottom tiers of the stack must be kept off the ground on timbers, rails, or other similar supports. Pipe on succeeding tiers must be alternated by bell and plain end. Timbers 4 inches by 4 inches in size must be placed between tiers and chocks must be placed at each end to prevent movement. For safety each size of pipe must be stacked separately. Stacking layers must be limited to the recommendations in the DIP Installation Guide.

#### 5-8.2.1 Asbestos Cement Pipe

Handling, saw cutting, and repair of asbestos cement water mains must be in accordance with the practices and procedures in the northwest section of the American Water Works Association Manual and in accordance with Safety Standards for Asbestos Removal and Encapsulation in accordance with WAC 296-65.

The Developer must provide protective clothing and equipment (coveralls, gloves, boots, head covering, goggles, respirators) to crews working with asbestos cement pipe in order to ensure the workers' exposure to asbestos material is at or below the limit prescribed in WAC 296-62-07705.

Asbestos cement pipe must be cut with a reed wheel cutter with controlled, flowing water.

Contaminated clothing must be transported in sealed, impermeable bags and labeled. Asbestos cement pipe must be left and buried in trench.

All service taps into asbestos cement and steel/iron water mains must be with saddle taps.

All connections to an existing asbestos cement water main must be made on the rough barrel portion of the pipe and not on a machined end.

### **5-8.3 CUTTING PIPE**

Whenever it becomes necessary to cut a length of pipe, the cut must be made by abrasive saw or by a special pipe cutter by a qualified technician. All pipe ends must be square with the longitudinal axis of the pipe. The outside edge of the pipe must be beveled, and otherwise smoothed, so that good connections can be made without damage to the gasket.

The Developer must obtain approval from both the Public Works Director and the Fire Marshall before any pipe cutting on existing water mains will be allowed. The Developer must comply with the conditions established by the Public Works Director and Fire Marshall. The Developer must give City's Public Works Department a minimum 72-hours' notice before the 48-hours' notice to customers before cutting any water main. Pipe cutting must be conducted under the direct supervision of the City construction inspector. No pipe cutting will be allowed outside of normal work hours or on holidays or weekends, unless specifically approved by the Public Works Director and the Fire Marshall.

### **5-8.4 LAYING PIPE ON CURVES**

Long radius curves, either horizontal or vertical, may be laid with standard pipe by deflecting the joints. If the pipe is shown curved in the drawings and no special fittings are shown, the Developer must deflect the water main at the joints as shown in the tables in Bothell Standards 5-8.4, or up to 80 percent of the manufacture's recommended allowable deflection. If shorter lengths are required, the drawings will indicate maximum lengths that can be used.

Where field conditions require deflection or curves not anticipated in the drawings, the City construction inspector will determine the methods to be used. When rubber gasketed pipe is laid on a curve, the pipe must be jointed in a straight alignment and then deflected to the curved alignment. Trench width construction must be made wider on curves to allow for joining, as specified.

Maximum deflections at pipe joints and laying radius for various pipe lengths are specified in the following tables. Pipe sizes not listed in the following table must not exceed 80 percent of the manufacturer's maximum permissible deflection.



MAXIMUM PERMISSIBLE DEFLECTION IN LAYING MECHANICAL-JOINT PIPE								
Pipe Size in Inches	Maximum Permissible Deflections Per Length - In Inches				Approximate Radius of Curve Produced by Succession of Deflections			
	12-ft Length	16-ft Length	18-ft Length	20-ft Length	12-ft Length	16-ft Length	18-ft Length	20-ft Length
3	16	23	25	27	105	130	155	180
4	16	23	25	27	105	130	155	180
6	14	19	22	24	120	160	175	200
8	11	14	16	18	160	220	240	265
10	11	14	16	18	160	220	240	265
12	11	14	16	18	160	220	240	265

MAXIMUM PERMISSIBLE DEFLECTION IN LAYING PUSH-IN JOINT PIPE								
Pipe Size in Inches	Maximum Permissible Deflections Per Length - In Inches				Approximate Radius of Curve Produced by Succession of Deflections			
	12-ft Length	16-ft Length	18-ft Length	20-ft Length	12-ft Length	16-ft Length	18-ft Length	20-ft Length
3	10	14	15	17	175	220	260	280
4	10	14	15	17	175	220	260	280
6	10	14	15	17	175	220	260	280
8	10	14	15	17	175	220	260	280
10	10	14	15	17	175	220	260	280
12	10	14	14	17	175	220	260	280

#### 5-8.5 CONNECTIONS TO EXISTING MAINS

The Developer must obtain approval from the Public Works Director and must notify the Fire Marshall and the Bothell Water Section before any pipe connection to existing water mains will be allowed. The Developer must comply with all the conditions established by the Public Works Director. The Developer must call the City inspection request line to give the City Public Works Department a minimum notice of three working days' notice before connecting any water main. No pipe connections will be allowed after normal work hours or on holidays or weekends, unless specifically approved by the Public Works Director.

If the connection to the existing system involves turning off the water, the Developer must call the City inspection request line to provide a minimum notice of three working days to the Inspector, Fire Marshall, Public Works Director, Water Section, prior to providing two working days' notice to the residents affected by the shutoff. The City will provide the Developer with notification door hangers and a list of the affected property owners to be notified. The Developer must distribute the door hangers to each affected service location 48 hours before the service interruption.

The Developer will supply all fittings and adapters required to connect to existing mains. All pipe, fittings, adapters, equipment, tools, and labor must be on site prior to turning off the existing water main for the connection.

The Developer will be allowed to make initial connections to the existing system only after the City construction inspector has witnessed a successful pressure test and satisfactory purity test results have been achieved.

The Developer must provide all ancillary items, including temporary plugs, caps, blow-offs, and blocking, and must construct the entire proposed facilities up to the point of connection for the pressure and purity tests. New lines must be installed to within one length of pipe (typically 18 feet) prior to testing and connection to existing.

All new taps and/or connections to existing water mains must be completed by the Developer and conducted under the direct supervision of the City construction inspector, at the Developer's expense, unless otherwise approved in writing by the Public Works Director.

Only City staff will operate valves for shutdowns and subsequent reactivation. No water system valves on existing mains must be operated by the Developer. Draining of existing water mains will be completed under the approval and supervision of the City construction inspector or by personnel in Bothell's Water Section. The Developer must connect a hydrant meter make-up at any and all temporary connection points between the City's existing system and all new pipe systems in excess of 20 feet in length. The hydrant meter make-up must be used for protecting the City's existing water system from possible contamination from the new pipe system.

All temporary, physical connections protected with a hydrant meter make-up must be minimized whenever possible and must not be left in use for extended periods of time, including evenings, weekends, and holidays. The temporary, physical connections must be allowed only when filling, purging the disinfection agent, and during bacteriological sampling. No physical connection to the City's existing water system is allowed during hydrostatic pressure testing. The hydrant meter make-up must be protected from freezing and maintained in good working order.

All direct connections between the City's existing system and new pipe systems under 18 feet in length must be made under the direct supervision of the City construction inspector and be swabbed with an acceptable disinfectant solution.

After receiving satisfactory water quality tests, the Developer will notify the City construction inspector to schedule the installation of the final connection. Final connection must be made under the direct supervision of the City construction inspector.

Prior to the final connection, all mainline and service valves must be set in the opened position. After a final connection is made to the City's existing water system, the Developer must not operate any valves.

All existing system valves, or valves located on a line which has received final approval, must remain untouched by the contractor/Developer.

#### **5-8.6 LOOPED MAINS**

All water mains must be designed as a looped system unless otherwise approved by the Public Works Director. Dead ending of a water main will not be permitted, unless approved by the Public Works Director.

Wherever possible, water main projects must be designed in such a way that the addition or improvements provide connections to more than one single supply pipe (source) within the distribution system.

## 5-9 SERVICE LINES

### 5-9.1 GENERAL REQUIREMENTS

All water main taps must be done with saddle taps. The minimum acceptable tap size must be 1 inch in diameter. Service connections to ductile iron water mains must be with Mueller, Rockwell, Romac, or approved equal pipe saddles with single stainless steel strap. Polyethylene encasement must be used to wrap all pipe for a distance of at least 3 feet in all directions, where two or more different types of metal are in contact.

Service lines from the water main to the meter for all services 2 inches and smaller must be high density polyethylene pipe. A 10 gauge insulated solid core copper tracer wire is required for polyethylene pipe. All service lines 4 inches and larger must be cement lined, ductile iron pipe from the main to the meter. Three (3) inch service lines will not be permitted.

All service connection piping within the public right-of-way must be a minimum of 30 inches below the finish grade. For further details on services and hook-ups, see the Standard Details. Water services must be installed perpendicular to the water main and in direct alignment to the property served.

**On services installed in conjunction with new water mains, the services must be installed from the main to the permanent setter and must be subjected to purity and hydrostatic testing with the new water main, as specified in 5-16 and 5-19.**

The Developer must not crimp a water service. An emergency crimp must only be performed by the City's Water Section only.

### 5-9.2 MATERIALS

Polyethylene tubing must conform to the requirements of AWWA C-901. The pipe must bear the seal of the National Sanitation Foundation for potable water pipe. Pipe joints must be made in accordance with the manufacturer's recommendations. Solvent welded pipe joints will not be permitted. The pipe must be IPS SDR-7 (PE 3408), with a minimum working pressure of 200 psi.

Ductile iron pipe must conform to Section 5-6.2.

### 5-9.3 CONNECTIONS

The minimum acceptable tap size must be one (1) inch in diameter. Service connections to four (4) inch ductile iron water mains must be made with Mueller, Rockwell, Romac, or approved equal pipe saddles. All connections must be perpendicular to the water main.

Service connections must not be installed on fire service mains or on fire hydrant runs between the hydrant valve and the fire hydrant.

All multifamily and commercial irrigation services must be on a dedicated service connection.

Connections must not be made within 18 inches of the end of a pipe section or fitting. All pipe taps on non-metal pipe must be staggered and have 12 inches of separation.

The abandonment of water service requires the service pipe to be disconnected from the valve (corporation stop) located at the connection point of the supply main/line and capped or plugged. The valve (corporation stop) must be shut off and capped.

#### **5-9.4 WATER METERS**

Typically, meters for City water services must be purchased from the City's Public Works Department and installed by City Water Section personnel. Prior to the installation of the meter, all appropriate connection charges must have been paid. Water meters will be set by City personnel only after the meter box and setter have been set to finished grade, inspected, and approved by the City construction inspector. Unless otherwise specified, all residential meters must be a minimum of 5/8 inch by 3/4 inch bore.

Meters 3 inches and larger must be approved by the Public Works Director and must be supplied and installed by the Developer. Water meters 3 inches and larger that are supplied and installed by the Developer, must be by a manufacturer specified by the City's Water Section and must be equipped with the AMR encoder registers.

All meters must be supplied with an AMR encoder register and a communication link, located in an easily accessible and approved location, for the transmission of data to handheld collection equipment compatible with the City's system.

Wherever practical, meters must be located within the public right-of-way. If a meter must be located on private property, its location must be approved by the Public Works Director, and the Developer must grant the City an easement to read the meter and to make repair to the service line when such service becomes necessary.

Water meters must typically be set within the planter strip aligned with the property line. Water meter vaults must be set a maximum of 24 inches from the back of the curb. In locations where curb and sidewalk are combined, the meter box must be located immediately behind the sidewalk. In cases where a curbline does not exist, the meter box/vault must be set 18 inches from the edge of the roadway. In cases where the water main is located outside of the roadway or public right-of-way, the water meter box must be set at the edge of the water main easement.

The meter box/vault is to be set perpendicular to the curb when not in hardscape.

Water meter boxes, including vaults, must not be installed within traffic areas. This includes driveways, parking stalls, loading zones, etc.

No landscaping materials, except lawn and bark, must be placed within 3 feet of the edge of the meter box.

Meter boxes and meter setters must be furnished and installed by the Developer.

Each separate building or premises must be individually metered.

## **5-10 VALVES FOR WATER MAINS**

### **5-10.1 GENERAL REQUIREMENTS**

All valves must be inspected by the City construction inspector in the field to ensure proper working order before installation and must be free of all rust and dirt. Valves must be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connecting ends furnished. The valves must be carefully inspected for injury to the outer protective coatings.

An operating nut extension must be installed when the ground surface is more than 36 inches above the valve operating nut. The operating nut extension must extend into the top section of the valve box and must clear the bottom of the lid by a minimum of 12 inches. When required, it must be furnished and installed by the Developer, see Standard Detail 528.

At a minimum, valving must be installed at all intersections of water mains, on each end of easements, and in line at maximum spacing of 500 feet. In residential applications, valves must be placed such that no more than 20 single-family residences would be out of service in any given shutdown. Additional valves may be required in high-density areas, as directed by either the Fire Marshall or the Public Works Director.

All fittings must be ductile iron unless approved by the Public Works Director.

### **5-10.2 AIR AND VACUUM RELEASE VALVES**

Air and vacuum release valves must be located at the highest point of the water main, which must be reviewed and approved by the Public Works Director.

### **5-10.3 BLOWOFF ASSEMBLIES**

Blowoff assemblies must be constructed at the locations shown on the approved plans, and in accordance with the Bothell Standards.

### **5-10.4 TRACER WIRE**

All water mains and services lines are to be provided with tracer wire. The tracer wire must be 10 gauge solid core insulated copper wire. All splices, and terminating ends must be fitted with pre-filled gel winged wire connectors, designed for direct burial applications. The tracer wire must be installed directly on top of all water mains/lines 4 inches and larger. All water services/lines 2 inches and smaller must be fitted with tracer wire, installed in a spiral motion around the service/lines.

For 1 inch services/lines, one terminating end must be at the inside top section of the meter box/enclosure, able to extend 12 inches out of the meter box. The other end must be mechanically attached firmly to the saddle or corporation stop.

For 1½ and 2 inch services/lines, one terminating end must be at the inside top section of the meter box/enclosure, able to extend 12 inches out of the meter box. The other end must be at the valve box located at the water main connection, as described below.

At valve boxes, the terminating end must be installed along the outside of the valve box sections, where the wire must enter into the top section of the valve box through a small entry hole drilled into the valve box top section, no more than 8 inches from finished grade. After inserting the wire through the hole, it must be filled with a silicone caulking. All terminating ends must have at least 12 inches of free play with coiled wire.

Valve boxes must have no more than one wire penetrating into the box. All splices are to be made outside the valve box and are to be looped and knotted ahead of the terminating splice. The knot must consist of all the wires associated with the splice in order to strengthen the splice.

#### **5-10.5 CHECK VALVES**

Check valves for permanent installations, other than cross connection control, must be rated the source pressure, unless otherwise specified. Check valves must provide non-slamming action under all conditions, unless otherwise specified. Check valves must be reviewed and approved by the Public Works Director for the intended application.

#### **5-10.6 GATE VALVES**

Buried gate valves must be epoxy coated ductile iron body, bronze mounted, resilient seat, non-rising stem, suitable for installation with the type and class of pipe being installed. Valves are to be equipped with a standard 2 inch operating nut, and O ring stem seals. Valves must be of the type to have two O ring stem seals in the stuffing box of the valve to facilitate seal replacement without valve dismantling.

All water mainline valves must be resilient wedge gate valves, unless otherwise directed by the Public Works Director.

Valves not buried must be specified on the plans.

Two inch gate valves must be heavy-duty type with a 2 inch drive block.

For every tee installed on a water main, three valves are required, one valve on each pipe leg, except for hydrant connections or as otherwise approved in writing by the Public Works Director. For every cross-connecting two water mains, four valves are required, one valve on each pipe leg, unless otherwise approved in writing by the Public Works Director. The purpose of installing a valve on each pipe leg is to ensure that each discrete pipeline can be isolated, while maintaining adequate flow throughout the adjacent piping network.

Allowable resilient wedge gate valves:

- U.S. Metroseal 250
- Waterous American Flow 2500
- Clow w/Ductile Iron Body
- M&H w/Ductile Iron Body
- Kennedy w/Ductile Iron Body
- Muellar A23-62 w/Ductile Iron Body
- AVK Series 45 Ductile Iron Body

#### **5-10.7 VALVE BOXES**

Valve boxes in paved areas must be cast iron, two-piece units designed with slots on the cover. The slots must be set directionally with the main. See Standard Detail 527.

The valve and valve box must be set plumb, with the valve box centered on the operator nut. Valve boxes must be set flush in pavement and gravel roads. An asphalt collar, per Detail 527A, is required around valve boxes located in gravel roadways or in gravel shoulders. When the top of the valve

operation nut is more than 3 feet below finished grade, a valve stem riser must be installed per Standard Detail 528. The minimum extension length must be 12 inches.

#### **5-10.8 VALVE MARKER POSTS**

Marker posts according to Standard Detail 529 must be installed for all valves located in unimproved or unpaved areas. Valve marker posts must be set as directed by the City construction inspector in a safe, reasonable, and conspicuous location. The valve type (BF, GV) and the distance to the valve is to be stenciled on the post in two (2) inch high lettering. Marker posts are not typically required for auxiliary hydrant valves. The valve marker posts must be installed in addition to the requirement for Carsonite markers spaced at 50-foot intervals marking the centerline of the waterline location.

#### **5-10.9 WATER MAIN MARKERS**

Carsonite water main markers must be installed whenever water mains are located in unimproved, or non-paved roadway surfaces. The markers must be spaced at minimum 50 feet intervals and located at all bends, marking the centerline of the water main location.

Carsonite markers must read: Buried Water Main, contact the City of Bothell at 425-486-2768.

#### **5-10.10 BLUE REFLECTIVE PAVEMENT MARKERS FOR HYDRANT**

##### **LOCATION**

Blue raised reflective pavement markers must be installed according to Standard Detail 523.



## **5-11 FIRE FLOW**

Fire flow requirements are calculated by the Fire Department. The Public Works Department will evaluate whether the existing system will meet the flow required, or if system improvements are required. All proposed new systems and improvements to existing water mains must first be reviewed and approved by the Public Works Director and the Fire Marshall. Field flow tests will be conducted only between September 1 and May 31. The Developer must notify the Public Works Department and the Fire Marshall at least seven days before the flow test is requested. Flow tests will be conducted by City staff only on Tuesdays, Wednesdays, and Thursdays.

## 5-12 HYDRANTS

### 5-12.1 GENERAL REQUIREMENTS

The force required to connect or disconnect the adapters must be 18 ft-lb minimum, and 30 ft-lb maximum.

Fire hydrant shutoff valves must be resilient wedge type gate valves. Whenever possible, hydrant valves must be located at least 6 feet from the hydrant. Hydrant valves must be located either in planting strips or within the paved roadways.

Fire hydrant restraining devices must be MEGA-LUG restrained mechanical joint connectors.

When a project or development will be served by an existing hydrant, that fire hydrant must be either upgraded or replaced to meet the current standards for fire hydrants in the City.

Fire hydrant runs are dedicated for the hydrant only. There must be no other connections to fire hydrant runs.

Fire hydrants must be located within the public right-of-way, on the short side of the water main, unless otherwise approved by the Public Works Director and the Fire Marshall. Upgrades to hydrants must include painting and adding a Storz adapter (see Standard Detail 520).

Dead-end runs in excess of 50 feet must be discouraged. If allowed, they must meet the required fire flow and be no less than 8 inches in diameter.

The Fire Marshall may require Water main extensions or new fire hydrant installations.

For single family homes and duplexes, a fire hydrant must be located within 300 feet of any structure, and spaced according to the requirements in BMC 20.32.

For all other buildings, a fire hydrant must be located within 150 feet, but not closer than 50 feet from any structure. The measured distance is to be along a route which would be traveled by fire equipment.

Fire hydrants in commercial areas must normally be spaced 300 feet apart.

Fire hydrants must be installed in accordance with Standard Details 520, 521, 522, and 524 at locations as shown on the approved plans. They must be painted with two brush coats of high gloss white Rust-Oleum type paint over shop applied primer base coat.

Water mains serving more than one fire hydrant must be looped unless otherwise approved by the Public Works Director and the Fire Marshall.

Hydrants must be the Traffic Model type with approved breakaway features, with a center operating nut. All hydrants must be brass to brass subseat, minimum valve opening of 5¼ inches O ring stem seal, 6 inch mechanical or flange shoe connection, 1-1/4 inch pentagonal operating nut. Only the following hydrants will be accepted:

- Clow Medallion
- M & H Style 929
- Mueller Super Centurion 250
- American Darling
- AVK Series 2780

In the Snohomish County portion of Bothell, all fire hydrants must have at least two 2-1/2 inch hose ports with caps, which must have National Standard male threads. The pumper port must be 4-1/2 inches in diameter with National Standard male thread. The pumper port must be provided with a 4 inch Storz assembly.

In the King County portion of Bothell, all fire hydrants must have at least two 2-1/2 inch hose ports with caps, with National Standard male threads. The pumper port must be 4 inches in diameter with Seattle Standard male thread. The pumper port must be provided with a 4 inch Storz assembly. All hydrants, when installed, must be covered by a burlap bag or other suitable covering until accepted by the City and placed in service.

The City must have the right to enter private property to use private fire hydrants for public purposes, including testing, flushing, and emergency use. In addition, when deemed necessary by the Public Works Director or the Fire Marshall, City personnel may enter private property for the purpose of inspecting, testing, flushing, and emergency use of all water facilities that are connected in any way to the City's water system.

#### **5-12.2 FIRE HYDRANT (STORZ) ADAPTER REQUIREMENTS**

1. Fire hydrants must be supplied with two 14-20 holes drilled and tapped, 180 degrees apart through female thread, to lock adapter to hydrant.
2. Developer must supply required sealants and gaskets.
3. Developer must supply two sets of installation tools.

#### **5-12.3 FIRE HYDRANT (STORZ) ADAPTER CAP REQUIREMENTS**

1. The Developer must provide and install one nitrile/vinyl rubber seal, suction style for zero leakage, gray in color. The Developer must furnish an additional seal to the Public Works Department.
2. The hydrant must come equipped with a 1/8 inch diameter rust proof or vinyl coated cable, 18 inches minimum in length, with compression connections to attach the cap to the hydrant.
3. Resistance to remove the Storz hydrant cap must require a Storz hydrant wrench to turn.

All hook-ups to fire hydrants for temporary water for any purpose must require a Hydrant Use Permit approved by the Public Works Director and Fire Marshall.

#### **5-12.4 FIRE HYDRANT GUARD POSTS**

Hydrant guard posts, when required, must be either reinforced concrete posts 8 inches in diameter by 5 feet long, or 6 inches in diameter by 5 feet long Schedule 40 steel pipe, concrete filled, and located according to Standard Detail 524.

#### **5-12.5 FIRE HYDRANT SHUT-OFF VALVES**

Fire hydrant shut-off valves must be resilient seat or resilient wedge type gate valves, as specified in Section 5-10.6. Whenever possible, hydrant valves must be located a minimum of 3 feet from the hydrant. Hydrant valves must be located either in planting strips or within the paved roadways.

#### **5-12.6 FIRE HYDRANT RESTRAINING DEVICES**

Fire hydrant restraining devices must be either by MEGA-LUG restrained mechanical joint connectors or as approved by the Public Works Director.

## 5-13 FIRE SPRINKLER SYSTEMS

Except for single family fire sprinkler systems, all fire sprinkler systems must be dedicated for fire sprinkler use and must have installed a double check detector assembly or a reduced pressure detector assembly listed for use with a fire sprinkler system. In the case of a non-typical installation of 1-1/2 to 2 inch multifamily fire sprinkler service connections, a metered double check valve assembly may be used in lieu of a Detector Assembly per Detail 576.

All backflow assemblies must be tested and certified by a Washington state Certified Backflow Assembly Tester, at the time of installation, annually, and whenever moved or repaired

All water meters that supply fire sprinkler services must be tagged with a 4 inch by 6 inch highly visible, waterproof label that states - FIRE - METER DO NOT SHUT OFF, or other language approved by the Fire Marshall.

In cases of retro-fitting, backflow devices approved for use with fire sprinkler systems must be evaluated on a case-by-case basis, and must be upgraded to meet current standards whenever modifications to existing systems are proposed.

The backflow assembly must be installed outside of the building structure being protected, and located just inside the customer's property line, within the water mainline easement. The distance from the mainline connection to the backflow prevention assembly must be minimized, and normally no more than 50 feet. Backflow assemblies must be protected from freezing.

Fire and sprinkler mains must be dedicated and supplied from a separate tap off of the supply main.

The minimum size of a double check detector assembly is 2-1/2 inches.

In cases of single family residential only, the domestic and fire sprinkler system may be combined, provided that the system meets the City's approval in accordance with 5-13.1.

All pumps, control valves, backflow assemblies, and meters used in conjunction with fire sprinkler systems must be listed for such use.

### 5-13.1 1 INCH SINGLE FAMILY RESIDENTIAL FIRE SPRINKLER SYSTEM

The service and meter for single family attached and detached dwellings must be based on the design specifications of the proposed system and be no less than 1 inch per Standard Detail 575A.

The service must be dedicated to a single service connection; a dual or branched meter set will not be allowed.

Except for flow-through systems, a tee connection must be installed within 12 inches of the domestic meter box. An inline ball valve, with locking ears, must be installed after the tee connection on the domestic service side of the tee. The branch portion of the tee must supply a Washington State Approved double check valve assembly per Detail 575A. The service piping installed after the double check valve assembly is to be installed with service piping rated for fire sprinkler use.

All flow-through systems must include a separate tap and meter for each residential attached or detached dwelling and be constructed with piping rated for fire sprinkler and potable water use. The fire sprinkler piping is to be designed and installed so that dead ends are eliminated and the

terminating end of the system is plumbed to a water closet (toilet, washing machine, etc.) so that water circulates through the system and water quality is maintained.

All piping and materials used must be rated and approved for drinking water and fire service.

The service from mainline connection to meter set, including meter set, must be dedicated to a single service connection and to be constructed per Standard Detail 510, 1 inch Water Service Assembly.

The fire sprinkler system must have an audible local alarm system in accordance with Bothell Fire Department requirements.

Landscape irrigation must have a dedicated service connection, including service tap, meter, and backflow assembly and must be constructed in accordance with the Bothell Standards.

Underground installation of a water main and valves to serve a fire sprinkler system must be undertaken only by, or under the supervision of, a competent contractor as defined under the provisions of WAC 212-80.

### **5-13.2 1-1/2 TO 2 INCH MULTIFAMILY FIRE SPRINKLER SYSTEM**

1-1/2 to 2 inch multifamily fire sprinkler service connections for typical installations are illustrated on Standard Detail 576.

The connection to the City water main must be accomplished by installing an equivalent mainline connection as identified in Standard Details 514 and 515.

Typical installation requires that a 2-1/2 inch double check detector assembly be installed just inside the customer's property line. The installation must be listed for fire sprinkler systems and must be protected from freezing.

### **5-13.3 3 TO 10 INCH FIRE SPRINKLER SYSTEM**

3 to 10 inch non-residential fire sprinkler service connections for typical installations are illustrated on Standard Detail 577.

In a typical installation, a main line valve must be located between the fire sprinkler service connection and the fire hydrant serving the Fire Department connection; and the assembly must be installed just inside the customer's property line.

Post indicator valves are typically located 40 feet from the building being served.

Fire Department connections are typically located no more than 450 feet from a fire hydrant.

## **5-14 PUMP, CONTROL VALVE, AND METERING STATIONS**

When pumps, control valves, and metering stations are required, all pipe, fittings, and appurtenances must be supported and blocked against static and dynamic loading in accordance with the equipment manufacturers' recommendations and as approved by the Public Works Director. All approved paintable surfaces must be coated with a minimum of two coats of lead-free paint. The paint must be rated for the surface being applied. Typically, pipe and fittings are to be blue and concrete surfaces tan in color (paint and color must be approved by the Public Works Director). The surfaces that must be kept free from paint include name and data plates, conduits, electrical fixtures and equipment, epoxied or powered coatings, and material consisting of primarily brass, copper, stainless steel, aluminum, plastic, and glass. Drain lines must be sloped to daylight, whenever possible; sump pumps may be required. A legal, physical air gap separation must be installed aboveground (over sewer structure, whenever possible) in all areas where discharge, pressure relief, or overflow lines are designed to vent to the atmosphere.

All piping elevation changes to match inside vault requirements must be made outside of vault, using restrained joints.

## 5-15 CONCRETE THRUST BLOCKING

Concrete thrust blocking, as indicated on Standard Details 530, 531 and 532, must be placed at bends, tees, dead ends, crosses, and as designated by the City construction inspector. Blocking must be Class 3000 concrete mix cast in place.

Concrete thrust blocks must be cast in place and have a minimum of 1/4 square foot of bearing against the fitting and 2 square feet of bearing against undisturbed soil and must be clear of joints so as to permit taking up or dismantling the joint. All cast-in-place blocking must have a minimum measurement of 12 inches between the pipe and the undisturbed bank. All blocking configurations and sizes must be as shown in Standard Details 530, 531 and 532. All tees, bends, crosses, caps, and valves that are to have cast-in-place blocking must be wrapped with two layers of 8 mil. visqueen before any concrete is placed. All blocking as shown in the Details are considered minimums, and consideration should be given to unusual circumstances and topography.

Although Standard Details 530, 531 and 532 will work well in most situations, they should not be used to substitute for professional engineering design, particularly in situations involving water mains with diameters greater than 8 inches, with water velocities greater than 10 feet per second, or soils where soil type or stability may be highly compressible or questionable. One of the more common cases of thrust block failure is the installation of thrust blocks in unstable soil, or in locations too close to the trenches for other pipelines.



## 5-16 HYDROSTATIC PRESSURE TEST

All water mains, water services, and appurtenances must be hydrostatically tested in accordance with AWWA Manual 41 and AWWA Manual 44, Chapter 3, and in accordance with the following:

Any exposed pipe, fittings, valves, hydrants, and joints must be examined carefully during the test. Any damage or defective pipe, fittings, valves, hydrants, or joints that are discovered following the pressure test must be repaired or replaced with reliable material; and the test must be repeated until satisfactory results are obtained.

Testing allowance must be defined as the quantity of makeup water that must be supplied to the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air expelled.

Any pressure drop during the test period must not be abrupt under any circumstances. The Public Works Director must be the sole judge as to whether the pressure drop is acceptable for the existing conditions.

The Developer must provide all necessary equipment and must perform all work connected with the tests. Prior to requesting the City construction inspector to witness the test, the Developer must perform the test to ensure that the test equipment is adequate, in good operating condition, and that all air has been released. All pressure testing equipment and gages must be correctly calibrated and include a calibration label or sticker documenting calibration not less than 12 months old.

All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test must be furnished, sanitized, and operated by the Developer.

The pipeline must be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks will be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer must furnish and install temporary blocking and remove it after testing. All physical connections to the existing water system must be removed prior to the test.

The mains must be filled with water and allowed to stand under pressure a sufficient length of time to allow air to escape and the lining of the pipe to absorb water. The City will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation.

The test must be accomplished by pumping the main up to the required pressure, stopping the pump for 2 hours, and then pumping the main up to the test pressure again. During the test, exposed sections of pipe being tested must be observed to detect any visible leakage. A clean container must be used for holding water for pumping up pressure on the main being tested. This makeup water must be disinfected by the addition of chlorine to a concentration of 50 mg/l.

Prior to the acceptance of the work, all new water lines must be subjected to a hydrostatic pressure test of 240 psi for 15 minutes with no pressure loss or leakage. The pressure testing pump must be located at the high point of the line unless otherwise approved by the City construction inspector. Any leaks developed must be remedied by the Developer before final acceptance of the work. Prior to testing, reasonable effort must be made by the Developer to remove all air in the lines. The mains must be tested between valves. If possible, no hydrostatic pressure must be placed against the opposite side of the valve being tested. Test pressure must be maintained while the entire installation is inspected. The Developer must provide all necessary equipment and must perform all work connected with the test. If the test does not pass

inspection for any reason, additional inspections required to witness the test must be done at the Developer's expense.

All tests must be successfully completed and approved by the City Construction Inspector before the new system may be connected to the existing system. A temporary plug (or 2 inch blow-off assembly on lines without hydrants) must be installed at the end of the new main. This must include concrete blocking necessary to withstand pressures encountered during the hydrostatic test.

Any visible leakage detected must be corrected by the Developer, regardless of the testing requirements specified above. Should the tested section fail to meet the pressure test successfully, as specified, the Developer must, at no expense to the City, locate and repair the defects and re-test the pipeline.

All tests must be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. After the test has been completed, each gate valve must be tested by closing each in turn and relieving the pressure beyond. This test of the gate valve will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Developer must verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

Sections to be tested must normally be limited to 1,500 feet. The City construction inspector may require that the first section of pipe, not less than 1,000 feet in length, installed by each of the Developer's crews, be tested in order to qualify the crew and the material. Pipe laying may not be continued more than an additional 1,000 feet until the first section has been tested successfully.

Prior to requesting the presence of the City construction inspector to witness the pressure test, the Developer must have all equipment set up and completely ready for operation and must have performed the pretest to ensure that the pipe is in a satisfactory condition.

Defective materials or workmanship, discovered as a result of the hydrostatic field test, must be replaced by the Developer at no expense to the City. Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic test must be rerun at the Developer's expense until a satisfactory test is obtained.

#### **5-16.1 TESTING EXTENSIONS FROM EXISTING MAINS**

When an existing water main is extended with new pipe to a new valve and the distance from the existing pipe to the new valve is 18 feet or less, the section of new pipe installed between the new valve and the end of the existing main must be made with pre-tested, pre-chlorinated pipe, and no hydrostatic test will be required. When the required hydrostatic tests are conducted in the new main section beyond the installed new valve in the closed position, the normal pressure of the existing main may be present against the other side of the new valve. Where the distance between the end of an existing water main pipe extension to the new valve is more than 18 feet, the connection of the new pipe to existing pipe must not be made until after hydrostatic tests have been made to the required pressure in both directions against the new pipe, beyond the new valve, as close as possible to the existing pipe for testing purposes.

The short length of pipe between the temporary cap or plug end with the new valve in the closed position, with no hydrostatic pressure active on the opposite side of the valve, must be subjected to the required test pressure. The same test must be made against the other side of the new valve when that section of pipe is tested with no hydrostatic pressure active in the short section of pipe toward the existing main. The final connection to the existing main must be made with pre-tested, pre-chlorinated pipe.

### **5-16.2 TESTING SECTION WITH HYDRANTS INSTALLED**

When hydrants are included with the section of main pipe to be tested, the testing must be conducted in two separate tests as follows:

**Test No. 1** - Water main gate valves and hydrant auxiliary gate valves closed, with the hydrant operating stem valves and hose ports wide open.

**Test No. 2** - Water main gate valves and the hydrant operating stem valves tightly closed, but the hydrant auxiliary gate valves and hose ports wide open.

### **5-16.3 TESTING HYDRANTS INSTALLED ON EXISTING MAINS**

For hydrants installed and connected to an existing main, the hydrant connection including hydrant tee, connection pipe, and auxiliary gate valves, must be installed with pre-tested materials and all fittings and connections visually inspected by the City construction inspector.

## **5-17 UNDERGROUND UTILITIES**

Activities such as trench excavation, tunneling or boring, pipe embedding, backfilling, compaction, safety and pavement patching, whether for public or private utilities, must conform to the requirements set forth in this and other sections of the Bothell Standards.

### **5-17.1 CONNECTION PROCEDURES**

When work is begun on a connection, it must proceed continuously, without interruption, and as rapidly as possible until completed. No main closures will be permitted overnight, over weekends, or on holidays. Typically, no connections will be allowed on Fridays.

If the connection to the existing system involves turning off the water, the Developer must provide a minimum notice of 48 hours to the City construction inspector, the Fire Marshall, the Public Works Director, and the residents affected by the shutoff. The City construction inspector will advise which property owners are to be notified.

The Developer may be required to perform the connection during times other than normal working hours. The Developer must not operate any valves on the existing system without the direct supervision of the City construction inspector or the City Water Section crew.

## **5-18 MAINTAINING SERVICE**

Where existing services are to be transferred from old to new mains, the Developer must plan and coordinate the work with the City construction inspector so that service will be resumed with the least possible inconvenience to customers.

To supply customers with water during the construction of a water main project where any section of the pipe has satisfactory hydrostatic and bacteriological test results, the City's Water Section reserves the right to tap corporation cocks into the section of new pipe and install service connections at such locations as the City may elect. The installation of any such service connections by the City must not be construed by the Developer as an acceptance by the City of any work.

## 5-19 DISINFECTION OF WATER MAINS

Before being placed in service, all newly-installed pipe must be flushed and chlorinated, and a satisfactory bacteriological report obtained.

No chlorination treatments must be allowed to remain in the water main over weekends or holidays. Chlorination treatment must be flushed from the water main between 24 and 48 hours of application.

Disinfection of water mains must be performed in accordance with AWWA Standard C-651-92 and the Bothell Standards.

No connection may be made between the existing distribution system and pipelines that are not disinfected, unless they are connected with a Washington state approved backflow prevention assembly, approved for this type of application.

The Developer must obtain the approval of the Public Works Director or City construction inspector prior to the installation or use of any backflow prevention assembly. To obtain the required flow for flushing on pipes sizes less than 8 inches in diameter, the backflow prevention assembly must be at least 4 inches. For pipe diameters between 8 and 18 inches, the backflow prevention assembly must be at least 6 inches.

Water mains must be flushed between 24 and 48 hours of chlorination. No flushing will be allowed on weekends or on holidays. The Developer must notify the City construction inspector a minimum of 48 hours in advance of flushing or flow testing. Flushing must meet the requirements of City of Bothell Standard Detail 553.

If no hydrant is installed at the end of the main, then a tap must be provided that is large enough to develop a velocity of at least 2.5 feet per second in the main. Taps required by the Developer for temporary or permanent release of air, chlorination, sampling, or flushing purposes must be provided by the Developer. Water services must be flushed with the water main to the angle meter stop and again, immediately prior to connection to the existing or new meter. The water service between the meter and the entrance to the structure must be flushed.

Samples must be collected and bacteriological tests obtained by the City construction inspector. The Developer is responsible for payment of all bacteriological testing.

Water used to disinfect and flush mains must be dechlorinated, and otherwise treated as required by Bothell Stormwater standards, prior to discharge to the stormwater system.

### 5-19.1 CHLORINE DOSAGE

#### ***AMOUNT OF CHLORINE REQUIRED FOR 50 MG/L DOSAGE***

<b>Pipe Size (inches)</b>	<b>Volume of Water Per 100 ft length (gallons)</b>	<b>Household Bleach 5-<sup>1</sup>/<sub>4</sub> percent (gallons)</b>	<b>Commercial Bleach 12-<sup>1</sup>/<sub>2</sub> percent (gallons)</b>
4	65.3	.06	.03
6	146.5	.14	.06
8	261.0	.25	.10
10	408.0	.39	.16
12	588.7	.56	.25

## **5-19.2 REQUIREMENT OF CHLORINE**

Before being placed into service, all new mains and repaired portions of, or extensions to, existing mains must be chlorinated so that a chlorine residual of not less than 25 mg/l remains in the water after standing for a minimum of 24 hours in the pipe (maximum standing time is 48 hours). The initial chlorine content of the water must not be less than 50 mg/l.

## **5-19.3 FORMS OF APPLIED CHLORINE**

Chlorine must be applied by one of the following methods from the AWWA Manual on Disinfection of Pipelines and Storage Facilities Field Guide.

### **5-19.3.1 Dry Calcium Hypochlorite**

Disinfection by Dry Calcium Hypochlorite in tablet or slug form is not allowed. Powdered Calcium Hypochlorite will not be allowed when the ambient water temperature in the water main is less than 41 degrees Fahrenheit.

### **5-19.3.2 Liquid Chlorine**

A chlorine gas-water mixture may be applied by means of a solution-feed chlorinating device, or the dry gas may be fed directly through the proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of chlorine gas must provide means to prevent back-flow of the water into the chlorine.

### **5-19.3.3 Chlorine-Bearing Compounds In Water**

A mixture of water and high-test calcium hypochlorite (65 to 70 percent Cl) may be substituted for the chlorine gas-water mixture. The dry powder must first be mixed as a paste, and then thinned to a 1 percent chlorine solution by adding water, to give a total quantity of 7.5 gallons of water per pound of dry powder. This solution may be injected in one end of the section of the main to be disinfected while filling the main with water.

### **5-19.3.4 Sodium Hypochlorite**

Sodium hypochlorite, commercial grade, (12.5 percent Cl), in the form of liquid household bleach (5 to 6 percent Cl), may be substituted for the chlorine gas-water mixture. This liquid chlorine compound may be used full strength or diluted with water and injected into the main in correct proportions to the fill water so that the dosage applied to the water will be at least 50mg/l.

## **5-19.4 POINT OF APPLICATION**

The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or at any valved section of it, and through a corporation stop inserted into the horizontal axis of the pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension. Alternative points of application may be used when approved by the City Water Section or the City construction inspector.

### **5-19.5 RATE OF APPLICATION**

Water from the existing distribution system, or other source of supply, must be controlled to flow very slowly into the newly-laid pipeline during application of the chlorine. The rate of chlorine gas-water mixture or dry gas feed must be in such proportion to the rate of water entering the newly-laid pipe that the dosage applied will be at least 50mg/l.

### **5-19.6 PREVENTING REVERSE FLOW**

No connection may be made between the existing distribution system and any pipelines that have not received purity results from a state-certified laboratory, unless they are connected with a Washington state approved backflow prevention assembly that has been approved for this type of application.

### **5-19.7 CHLORINATING VALVES, HYDRANTS, AND APPURTENANCES**

In the process of chlorinating newly-laid pipe, all valves, hydrants, and other appurtenances must be operated while the pipeline is filled with the chlorinating agent and under normal operating pressure.

### **5-19.8 CHLORINATING CONNECTIONS TO EXISTING WATER MAINS AND**

### **5-19.9 WATER SERVICE CONNECTIONS**

The chlorinating procedure to be followed must be as specified in Section 11 of the AWWA Manual 41. All closure fittings must be swabbed with a chlorine solution at least as strong as household bleach (5-6 percent Cl).

### **5-19.10 FLUSHING AND TESTING**

All water mains must be flushed between 24 and 48 hours of chlorination. No flushing will be allowed on weekends or on holidays. The Developer must notify the City construction inspector a minimum of two working days in advance of any flushing or flow testing.

Sections of pipe to be disinfected must first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, then a tap must be provided, that is large enough to develop a velocity of at least 2.5 feet per second in the main. See Standard Detail 553. Taps required by the Developer for temporary or permanent release of air, chlorination, or flushing purposes must be provided by the Developer.

Following chlorination, all treated water must be flushed from the newly-laid pipe until the replacement water throughout its length shows, upon testing, the absence of chlorine. In the event chlorine is normally used in the source of supply, then the tests must show a residual not in excess of that carried by the system.

The Developer must safely dispose of all treated water flushed from mains to the sanitary sewer system, provided that it is available, that approval from the Public Works Director is given, and a legal, fixed air gap arrangement, as defined in WAC246-290-490, is provided between the sewer system and water discharge arrangement. When approved by the Public Works Director, disposal may be made to any available sanitary sewer. The Public Works Director may require the Developer to notify King County Wastewater Treatment Division of their intention to dispose of the treated



water into King County Wastewater Treatment Division sewers. Otherwise, the Developer must safely dispose of all treated water flushed from mains to the storm system in a method approved by the City. Discharging to the storm system requires that the treated hyperchlorinated wastewater be neutralized prior to entering the storm system or any natural drainage channel. The Developer is responsible for disposing of disinfecting solution to the satisfaction of the City.

Samples collected from representative points in the new system by City Water Section staff or the City construction inspector must be tested for bacteria by a state-certified laboratory and satisfactory test results obtained before placing the water main into service. The Developer must pay all testing expenses.

At the discretion of the Public Works Director, or the City Fire Marshall, a high velocity flush, in excess of 7 feet per second, may be required prior to acceptance. All high velocity flushing activities must be coordinated and conducted by City Water Section staff. The Developer must provide all equipment, materials, and staffing necessary to assist in the performance of the flush. This may include traffic control, neutralizing agents, landscape restoration, additional discharge hoses, etc. The high velocity flush must be scheduled through the construction inspector, a minimum of 10 working days prior to the flush. Flushing requests must be approved by the Public Works Superintendent. Operational conditions may substantially delay high velocity flushing activities for the project.

#### **5-19.11 REPETITION OF FLUSHING AND TESTING**

Should the initial treatment result in an unsatisfactory bacteriological test, chlorination must be repeated until satisfactory results have been obtained. Failure to achieve a satisfactory test must be considered as failure of the Developer to keep the pipe clean during construction, or to properly chlorinate the water main.

## **5-20 ACCEPTANCE OF WATER SYSTEMS**

The following steps must be completed before the City will accept the improvements and release the performance bond.

1. All easements must be reviewed, approved, and recorded, as per Section 1-9.3.
2. The water system must have been tested, inspected, approved, and accepted by the City construction inspector.
3. The City construction inspector must have received, reviewed, and approved the as-builts as per Section 1-14.
4. The City must receive a satisfactory maintenance bond per Section 1-5.2.

# Chapter 6

## SANITARY SEWERS



City of Bothell™

## DESIGN AND CONSTRUCTION

## STANDARDS AND SPECIFICATIONS

2019

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## 6-1 GENERAL REQUIREMENTS

The City of Bothell provides sewer service to approximately 50 percent of the city. This section of the Bothell Standards pertains to the City's sewer service area only. For information on sewer requirements outside the City's sewer service area, please contact the appropriate sewer utility district.

All sanitary sewer mains, side sewers, sanitary sewer manholes, and sanitary sewer facilities must be designed and constructed in accordance with the latest issue or revision of the Criteria for Sewage Works Design (Orange Book) published by the Washington State Department of Ecology, the WSDOT/APWA Standard Specifications and WSDOT Standard Plans, and the Bothell Standards and Details for sanitary sewers. All connections to King County Wastewater Treatment Division facilities must conform to King County Wastewater Treatment Division standards.

A sanitary sewer main extension must be constructed when the property does not front on a sewer main. The extension must be to a point at least 5 feet beyond the farthest edge of the property, or as directed by the Public Works Director. Sewer main improvements must be constructed when the existing sewer main is not adequate for the proposed increased use (criteria used to determine adequacy include, but are not limited to, age, pipe diameter, type, and conditions of existing sewer mains). The City's most current Wastewater Comprehensive Plan, the Capital Facilities Element of the Imagine Bothell...Comprehensive Plan, and TV inspection results must be the primary resources utilized to determine adequacy. The improvements must extend from the project to a point where the system is deemed reliable. The improvements must be consistent with the Bothell Standards for new construction and must be approved by the Public Works Director.

All sanitary sewer pipe to be installed must be structurally sound for the design depth.

All requests for inspections and for witnessing tests must be scheduled with the City construction inspector by calling the inspection request line at least 24 hours in advance, and no more than 7 days in advance. Failure to give adequate notice may result in delays to the work for required inspections.

All oils, grease, and contaminants from facilities must be intercepted in accordance with Bothell Municipal Code 18.03 and the Uniform Plumbing Code. All underground parking facilities must drain into the sanitary sewer systems through a grease interceptor.

## **6-2 PERMITS**

In addition to the appropriate permits listed in Section 1-6, additional permits may be required by the City, Washington State Department of Fish & Wildlife, Ecology, King County Wastewater Treatment Division, and Snohomish County. The Developer must submit copies of these approved permits to the City before the City will issue a right-of-way invasion permit.

## **6-3 EASEMENTS**

All sewer mains not located in the public right-of-way that are to be maintained by the City, must be located within a tract. When creation of a tract is not possible, the sewer main must be centered within easements granted to the City. All easements must meet the requirements of Section 1-9.3. If the sewer is placed deeper than 7.5 feet, the easement width must be at least 2 times the burial depth of the sanitary sewer.

Carsonite markers must be installed every 50 feet and at all structures when the sewer main is not installed in the roadway.

Easements must be fenced, with paved access to manholes.

## **6-4 ALIGNMENT TOLERANCE**

1. Maximum deviation from established line and grade must be  $\frac{1}{32}$  inch per inch of pipe diameter, and  $\frac{1}{2}$  inch per pipe length.
2. No adverse grade in any pipe length will be permitted.
3. The maximum deviation from established line and grade between two successive joints must be  $\frac{1}{3}$  of the amounts specified above.



## 6-5 CONSTRUCTION PLANS

See Section 1-9 for construction plans requirements and Appendix C for required Standard Notes on Plans.

1. Sewer and water plans may be combined. Other utilities must be included in half tone background to show their relative locations.
2. Plans must show existing and proposed easements where mains are on private property. All mains, manholes, and other appurtenances must be located within the easements, which must be a minimum of 15 feet wide.
3. Easements must be executed at completion of construction. Sewer mains must be centered in the easement as much as possible. Access to easements must remain open for maintenance and repair. Structures and fences may not be located, nor trees and shrubs planted, on easements.
4. Show elevations of sewer mains, water mains, and storm drains where they cross each other. If possible, angle crossings between sewer mains and sanitary sewers or between water mains and storm lines should be at 90 degrees wherever possible, avoid intersection angles of less than 75 degrees.
5. A minimum of 10 feet of horizontal clearance must be maintained between water mains and sewer lines. A 5-foot horizontal clearance must be maintained between water mains and all other utilities. If the separation requirements are not possible, the Developer must design the system in accordance with practices in the most recent publication of the AWWA subject to approval by the Public Works Director.
6. There must be a minimum 18 inches vertical separation wherever a water main crosses a sanitary sewer or storm sewer, or wherever a water service crosses a sanitary side sewer or a storm line. All other utilities (including gas, power, phone, and cable) must be located a minimum of 18 inches below the water utility. Any deviation from these requirements must be approved by the Public Works Director and be consistent with the latest Department of Health Water System Design Manual.
7. Before any construction begins, the Developer must provide the City with the name and contact information for the person in charge who can be contacted 24 hours a day regarding construction-related problems.
8. Whenever a leak occurs on a new section of main the Developer must replace the section of main with new.
9. Whenever a leak or other damage occurs to an existing section of main or connection the Developer must make all repairs.
10. A copy of approved construction plans must be on site during all phases of construction.
11. Structure lids and other appurtenances or vaults with lids within the road must be located outside of the vehicle wheelpath to the maximum extent practicable.

## 6-6 MANHOLES

### 6-6.1 SECTION DESCRIPTION

This work must consist of constructing manholes in accordance with the Bothell Standards and Section 7-05 of the WSDOT/APWA Standard Specifications. Where conflicts occur, the Bothell Standards must have precedence over Section 7-05 of the WSDOT/APWA Standard Specifications.

### 6-6.2 MATERIALS

Manholes must be constructed of precast units in accordance with Standard Detail 621. Any request to deviate from this detail must be reviewed by the Public Works Director.

Manholes must be constructed in accordance with AASHTO M-199 (ASTM C 478), unless otherwise shown on plans or noted in WSDOT/APWA Standard Specifications.

All reinforced cast-in-place concrete must be Class 4000. Non-reinforced concrete in the channel and shelf must be Class 3000. All precast concrete must be Class 4000. Manhole channels must be Class 3000 concrete. When using adjustment rings on top of the cone or flat top, a minimum of one to a maximum of three 4-inch precast concrete rings may be used for adjustment of the casting to final street grade. Refer to Detail 621. Use no bricks or wood to raise iron.

Precast bases must be furnished with cutouts, or may be core drilled in the field.

All base reinforcing steel must have a minimum yield strength of 60,000 psi and be placed in the upper half of the base with 1 inch minimum clearance.

The size of the cutout hole must be equal to the outer diameter of the pipe plus the wall thickness of the manhole. The maximum hole size is 36 inches for a 48 inch manhole, and 42 inches for a 54 inch manhole. The minimum distance between holes is eight (8) inches measured on the inside of the manhole.

A 1-foot precast section is required below the cone or flat top.

Manhole size depends on sizes, location, and numbers of holes for pipes. Manhole design and size must be approved and warranted by the manhole supplier.

Joints between manhole sections must be rubber gasket and mortared inside and out.

Standard precast cones must provide reduction from 48 inches to 24 inches with a height not less than 18 inches and from 54 to 24 inches with a height not less than 24 inches.

Standard flat slab covers must be at least 8 inches thick and must conform to the outer dimension of the standard sections upon which they are to be placed.

For heights over 25 feet, the manhole base slab design must be designed by a structural engineer.

## **6-6.3 CONSTRUCTION REQUIREMENTS**

### **6-6.3.1 Bedding**

Unless otherwise directed by the Public Works Director, manholes constructed with precast base sections or cast-in-place sections must be placed to grade upon 6 inches minimum depth of crushed surfacing base course meeting the requirements of Section 9-03.9(3) of the WSDOT/APWA Standard Specifications. The crushed surfacing base course must be compacted to 95 percent maximum density.

### **6-6.3.2 Joints**

Joints between precast manhole elements must be rubber gasketed in a manner similar to pipe joints conforming to ASTM C-443 and they must be grouted inside and out. Shop drawings of the joint design must be submitted to the Public Works Director for approval prior to manufacture. Completed joints must show no visible leakage and must conform to the dimensional requirements of ASTM 478.

### **6-6.3.3 Manhole Channels**

All manholes must be channeled, unless otherwise approved by the Public Works Director. Channels must match existing sewer grades. Channels must converge with smooth transitions rounded into well-finished junctions. Channel sides must be carried up vertically to the crown elevation of the various pipes. Channel width must be wide enough to accept a vactor tube for maintenance. Concrete shelves between channels must be smoothly finished, warped evenly, and sloped to drain.

All manholes must have a minimum drop of 0.10 feet to a maximum drop of 1.0-foot between the invert in and the invert out.

### **6-6.3.4 Manhole Pipe Connections**

All pipes entering or leaving the manhole must be core drilled to the size of the Kor-N-Seal boot (or approved equal) manufacturer's specifications for the pipe size being used. Flexible pipe joint must be placed within 2 feet of the outside face of the manhole in locations with compressible soil such as peat or unconsolidated sediment. The flexible joint must be placed on firmly compacted bedding, particularly within the area of the manhole excavation, which normally is deeper than that of the sewer trench.

Pipe connected to manholes must be provided with a Kor-N-Seal boot (or approved equal) manhole adapter, complete with gasket, and must be approved by the Public Works Director.

### **6-6.3.5 Steps**

Manholes 3 feet and deeper must have steps as per Standard Detail 643, and must be installed on sides of manholes, opposite of pipe and channels where possible. First step must be 18 to 24 inches from top of casting.

#### **6-6.3.6 Connections to Existing Manholes**

The Developer must verify invert elevations prior to construction. The crown elevation of laterals must be the same as the crown elevation of the incoming pipe, unless specified. The existing base must be reshaped to provide a channel equivalent to that specified for a new manhole.

The Developer must excavate completely around the manhole to prevent unbalanced loading. The manhole must be kept in operation at all times and the necessary precautions must be taken to prevent debris or other material from entering the sewer, including a tight pipeline bypass through the existing channel, if required.

The Developer must core drill to the size of the Kor-N-Seal boot (or approved equal), according to the manufacturer's specifications for the size of pipe used. Jackhammers must not be used.

The Developer must provide protective clothing and equipment (coveralls, gloves, boots, head covering, goggles, respirators) to crews working with asbestos cement pipe in order to ensure the workers' exposure to asbestos material is at or below the limit prescribed in WAC 296-62-07705.

Asbestos cement pipe must be cut with a reed wheel cutter with controlled, flowing water.

Contaminated clothing must be transported in sealed, impermeable bags and labeled. Asbestos cement pipe must be left and buried in the trench.

#### **6-6.3.7 Spacing**

Maximum spacing of manholes must be 300 feet, unless approved by the Public Works Director. All manholes are to be accessible to maintenance vehicles.

A manhole is required at any change in pipe slope, alignment, or size. Manholes are not allowed in a fill section, unless base is on a cut section. A manhole is required at the ends of all sewer mains, unless a cleanout is specifically approved by the Public Works Director for camera access.

Manholes not set in the roadway must have paved asphalt access, at least 12 feet wide, to and including the manhole pad.

## **6-7 SEWER MAIN**

### **6-7.1 MATERIALS**

Sanitary sewer pipe must meet the following requirements:

1. PVC Sewer Pipe: Polyvinyl Chloride (PVC) sanitary sewer pipe must conform to the requirements of ASTM D-3034 SDR-35.
2. Ductile Iron Sewer Pipe: Ductile iron sanitary sewer pipe must conform to ANSI A-21.51 or AWWA C-151 and must be epoxy cement mortar lined, push-on joint or mechanical joint. The ductile iron pipe must be Class 50, unless otherwise approved.

### **6-7.2 GENERAL REQUIREMENTS**

No broken or defective sewer pipe or related materials must be used.

The maximum trench width (from the foundation to 12 inches above the pipe) must be 40 inches for pipe with an inside diameter of 15 inches or less. For pipe with an inside diameter of 18 inches or more, the maximum trench width must be 1.5 times the inside diameter plus 18 inches. (see Standard Details 470 and 471). If the maximum trench width is exceeded without authorization from the City construction inspector, the Developer must provide, at the discretion of the construction inspector, pipe with a higher strength classification, or a higher class of bedding.

During excavation, installation of sewer lines, and placement of trench backfill, excavations must be kept free of water. The Developer must control surface runoff to prevent entry or collection of water in excavations. The static water level must be drawn down at least 1-foot below the bottom of the excavation to maintain the undisturbed state of the foundation soils and to maintain the required density of any fill or backfill. The dewatering system must be installed and operated so that the groundwater level outside the excavation area is not reduced to an extent that would damage or endanger adjacent structures or property.

### **6-7.3 UNDERGROUND UTILITIES**

Activities such as trench excavation, tunneling or boring, pipe embankment, backfilling, compaction, safety and pavement patching, whether for public or private utilities, must conform to the requirements set forth in other sections of the Bothell Standards.

### **6-7.4 PIPE BEDDING**

See Standard Details 470 and 471. Pipe bedding must be at least 6 inches deep beneath the pipe. Bedding must be installed and spread smoothly so that the pipe is uniformly supported. Subsequent lifts are not to exceed 6 inches in thickness and must be installed to the crown of the pipe. All lifts must be individually compacted to 95 percent density as determined by ASTM D-698. An 18 inch lift must be placed and compacted over the crown of the pipe, prior to backfilling the trench. The Developer may use controlled density fill (CDF) for pipe backfill above the pipe's invert level, with approval of Public Works Director.

### **6-7.5 LAYING SEWER PIPE**

All sewer main installations must have the line and grade set by survey, prior to construction. Staking must show each manhole and cuts to all inverts. All mains are to be laid straight between

manholes at a minimum depth of 8 feet, measured at the invert, unless the approved plans show otherwise or unless specifically approved otherwise in writing by the Public Works Director.

The Developer may use any method, such as swede line and batter board or laser beam etc., to accurately transfer the surveyor-provided control points to the designated alignment and grade.

When using the swede line and batter board method, the Developer must transfer line and grade into the trench where they must be carried by means of a taut grade line supported on firmly set batter boards at intervals of not more than 30 feet. Not less than three batter boards must be in use at one time. Grades must be constantly checked and in event the batter boards do not line up, the work must be immediately stopped and the cause remedied before proceeding with the work.

When using a laser beam to set pipe alignment and grade, the Developer must constantly check the position of laser beam from surface hubs provided by the surveyor to ensure the laser beam is still on alignment and grade. In the event the laser beam is found out of position, the Developer must stop work and make the necessary corrections to the laser beam equipment and pipe installed.

There must be a minimum horizontal clearance between sewer and water main pipe of 10 feet, unless another design alternative has been specifically approved by the Public Works Director. Sanitary sewers must always be installed lower than water mains. Where sanitary sewers and water mains cross, there must be a minimum vertical separation of 18 inches from the crown of the sanitary line to the invert of the water main, unless an alternative design has been specifically approved by the Public Works Director.

Sanitary sewers laid 18 feet and deeper must be epoxy cement lined, ductile iron pipe, Class 50.

Trenches must be excavated to the depth and grade required. Pipe bedding must be placed to provide a uniform and continuous bearing and support for the pipe on solid, undisturbed or compacted ground.

Sewer lines must be laid upgrade from the starting point of connection on the existing sewer, or from a designated starting point, as approved by the City construction inspector. Sewer pipe must be installed with the bell end forward or upgrade. After placing a length of pipe in the trench, the spigot must be centered in the bell and the pipe forced home and brought to correct line and grade. During joining, the pipe must be partially supported to minimize unequal lateral pressure and to maintain concentricity. Pipe handling after the gasket has been affixed must be carefully controlled to avoid disturbing and dislocating the gasket. Any disturbed or dislocated gaskets must be removed, cleaned, replaced, and lubricated before joining the sections.

The maximum length of open trench on streets and roadway shoulders must not exceed 300 feet at any time, unless specifically approved by the City construction inspector. The Developer must ensure that the project site is a safe environment at all times. At the end of each day, all open trenches must either be backfilled or covered with steel plates and barricaded with attached flashing yellow lights to prevent vehicles, people, and animals from falling into the trench.

Where trench excavation equals or exceeds a depth of 4 feet, the Developer must provide, construct, maintain, and remove, as required, safety systems that meet the requirements of the Washington Industrial Safety and Health Act, RCW 49.17, including WAC 296-155. The trench safety systems must be designed by a qualified person, and meet accepted engineering requirements (see WAC 296-155-650-66411). Trenching activities must be completed in accordance with Bothell Standards 5-7.

Compaction tests are required for all backfilled trenches in paved public roadways and in roadway shoulders. A minimum of one test location will be chosen by the City construction inspector for every 200 linear feet of sewer main installed. The City construction inspector has the discretion to require additional tests, and to specify test locations. All testing will be at the Developer's expense.

The Developer must remove from the project site, at their expense, all excavated trench material deemed by the City construction inspector to be unsuitable for trench backfill.

No construction materials, soil, debris, etc. may be stockpiled in the public right-of-way unless specific permission is granted in writing by the City construction inspector.

Under no circumstances may pipe materials be dropped or dumped into the trench. Broken or otherwise defective pipe must be removed from the job site and replaced.

Every precaution must be taken to ensure foreign material does not enter the pipe. When pipe laying is not in progress, the open ends of the pipe must be closed by a watertight plug or other means approved by the City construction inspector. If water is in the trench when work resumes, the seal on the pipe must remain in place until the trench is completely pumped dry. No pipe may be laid in water, or when, in the opinion of the City construction inspector, trench conditions are unsuitable.

No willows, poplars, cottonwoods, birches, soft maple, gum, or any other tree or shrub whose roots are likely to obstruct public sewers are allowed within 30 feet of any public sewer in accordance with BMC 18.03.590. Any of these trees found to be located within 30 feet of a proposed sewer main must be removed at the Developer's expense. Any of these trees planted or established within 30 feet of constructed public sewers facilities must be removed by the property owner or owners association.

#### **6-7.6 PLUGS AND CONNECTIONS**

All fittings must be capped or plugged with a plug of an approved material and gasketed with the same gasket material as the pipe unit, or the pipe must be fitted with an approved mechanical stopper, or the pipe must have an integrally cast knock-out plug. The plug must be able to withstand all test pressures without leaking.

#### **6-7.7 JOINTING**

Where it is necessary to break out or connect to an existing sewer during construction, only new pipe having the same inside diameter must be used in reconnecting the sewer. Where joints must be made between pipes with a mismatched wall thickness, the Developer must use flexible gasketed coupling, adapter, or coupling-adapter to make a watertight joint. Couplings must be those manufactured by Romac, Smith Blair, or approved equal, for reinforced pipes and Fernco, or approved equal, as approved by the City construction inspector for non-reinforced pipes.

#### **6-7.8 JACKING, AUGURING, OR TUNNELING**

Reserved.

### 6-7.9 SIZE

The minimum pipe size for sanitary sewer mains must be 8 inches in diameter. The Public Works Director will determine the pipe size required to serve the surrounding area.

### 6-7.10 SLOPE

All sewers must be designed and constructed to give mean velocities of not less than 2.0 feet per second when flowing full. The following minimum slopes must be provided, however greater slopes are desired.

Sewer Size (inches)	Minimum Slope (feet per 100 feet)
6 inches	1.0 percent
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24	0.08

If the current Criteria for Sewage Work Design manual requires different slopes, those slopes in Criteria for Sewage Work Design must apply.

### 6-7.11 PAVEMENT PATCHING

See 3-10

### 6-7.12 CLEANING AND TESTING OF SANITARY SEWERS

All sanitary sewer pipe must be cleaned and tested after backfilling. Testing must be by either exfiltration or low pressure air method. The Developer has the option to select the method of testing, unless the groundwater table is such that the City construction inspector may require the infiltration test.

The Developer must clean and flush all sewer lines with clean water and use an approved cleaning ball prior to testing. The cleaning ball must be an inflatable, diagonally ribbed rubber ball of a size that will inflate to fit snugly into the pipe to be tested. A rope or chord must be fastened to the ball to enable total control of the ball at all times.

All testing must be under the direction and in the presence of the City construction inspector. The Developer must contact the City construction inspector at least three working days before testing is to occur. Cleaning and testing of sewer lines must be completed within 15 working days of backfilling, unless otherwise approved in writing by the City construction inspector. The Developer must furnish all labor, materials, tools, and equipment necessary to make clean and test the sewer lines. Any damage resulting from testing must be repaired by the Developer to the satisfaction of the City construction inspector.



All wyes, tees, and stubs must be plugged with flexible jointed caps, or acceptable alternate, securely fastened to withstand the internal test pressure. These plugs or caps must be readily removable and their removal must provide a socket suitable for making a flexible, jointed, lateral connection or extension.

If the Developer elects to test large diameter pipe one joint at a time, leakage allowances must be converted from GPH per 100 feet to GPH per joint by dividing by the number of joints occurring in 100 feet. If leakage exceeds the allowable amount, corrective measures must be taken and the line must be re-tested to the satisfaction of the City construction inspector.

If any sewer installation fails to meet the requirements of the test method used, the Developer must determine the source or sources of leakage and must replace all defective pipe. The complete pipe installation must meet the requirements of the test method used before being considered acceptable. Replacement of defective pipe must not commence until the Developer has received approval of their plan from the City construction inspector.

#### **6-7.13 EXFILTRATION TEST**

Prior to exfiltration leakage testing, the Developer may fill the pipe with clear water to permit normal absorption into the pipe walls. The Developer must complete the leakage test within 24 hours after filling the pipe. When under test, the allowable leakage must be limited according to the following provisions. Specified allowances assume pre-wetted pipe.

Leakage must be no more than 0.28 GPH per inch diameter per 100 feet of sewer, with a hydrostatic head of 6 feet above the crown at the upper end of the test section, or above the natural groundwater table at the time of test, whichever is higher. The length of pipe tested must be limited so that the pressure at the lower end of the section tested does not exceed 16 feet of head above the invert; and in no case must the length of pipe being tested be greater than 700 feet or the distance between manholes, whichever is shorter.

Where the test head is other than 6 feet, the maximum leakage must be 0.28 GPH per inch of diameter per 100 feet of pipe length times the square root of the test head. The leakage can be determined from the equation:

$$\text{Maximum leakage (in gallons per hour)} = 0.28 \times \frac{\sqrt{H}}{\sqrt{6}} \times D \times \frac{L}{100}$$

Where: D = diameter (inches)  
L = length of pipe (feet)  
H = test head (feet)

When the test is to be made one joint at a time, the leakage per joint must not exceed the computed allowable leakage per length of pipe.

#### **6-7.14 SANITARY SEWER CLOSED CIRCUIT TELEVISION INSPECTION WITH AUDIO ASSESSMENT**

Before the City will issue final acceptance of the project, the interior of all mainline Sanitary Sewer pipes, and all manhole connection pipes larger than 6 inches in diameter must be inspected by Closed Circuit Television (CCTV) camera and footage provided to the City in DVD format. Personnel performing television inspection must have completed the Pipeline Assessment and Certification Program (PACP) and submit to the Engineer at least 3 working days in advance of the first television inspection. The City does not accept VHS tapes.

The CCTV camera must have zoom capability as well as a 360 degree radial view color television camera (also known as a pan and tilt) with a mechanical footage counter calibrated to indicate video footage consistent with distance traveled in the pipe. Footage must be zeroed at the centerline of the manhole where the video starts and footage increases as it travels forward, and decreases when backward camera movement is required. Display footage must be shown on the video.

The camera must have a light source providing adequate illumination to clearly identify pipe invert, crown, joints, sides, connections, and infiltration/exfiltration. Provide adequate illumination to record images at least 15 feet in front of the camera.

Audio commentary must be objective and based on PACP defined assessment conditions. Audio must be intelligible and as free from interference and background noise as can reasonably be done. Do not use subjective comments such as: the fault of, caused by, and opinion. Comments must include the footage counter reading, each connection, the starting and ending structure, indicated flaws, areas of infiltration/exfiltration, open joints, outfall, and other features as may be necessary.

Submit television inspections on DVD-R discs. All inspections must be in a PACP format, and able to be uploaded to the City GraniteNet database.

Each individual sanitary sewer main inspection, from manhole to manhole, must be recorded on one digital file. The City will accept multiple digital files for a single pipe only when the pipe reach cannot be recorded to one digital file due to extreme pipe length or obstructions in the pipe. The City will not accept multiple sewer main inspections recorded on a single digital file.

The City will not accept dirty, blurry, foggy, submerged, or otherwise non-viewable inspections.

Prior to inspection, the Developer must have completed the manhole channeling, grouting, trench backfill, compaction, and final restoration of the street or easement. The City must have accepted the invert elevations and record drawings. All sewer mains and laterals must be cleaned. All lines not clean must be re-flushed, cleaned, and re-inspected.

At least two days prior to the inspection, the Developer must inform the City construction inspector when and which lines will be inspected.

Immediately preceding the CCTV inspection, water with dye must be poured into the system and must be visible on the DVD recording.

At the beginning of each sewer main inspection, the information listed below must be electronically generated and displayed on the CCTV footage. This data must be continuously updated, and displayed on the CCTV footage, during the inspection.

1. Date of inspection
2. Developer and contractor company name
3. Operator name
4. Upstream manhole number to downstream manhole number
5. Direction of inspection (upstream or downstream)
6. Pipe material and size

A one (1) inch ball must be placed immediately in front of the camera, mounted such that the ball contacts the pipe bottom at all times. CCTV inspection cannot be paused once it begins. Only continuous inspections are acceptable. Pipe joints, manholes, and connections into manholes must be thoroughly inspected by panning the entire connection, including manhole risers. Zooming inspection of all lateral connections is required. The Developer will bear all costs incurred in correcting any deficiencies found during the CCTV inspection, including the cost of any additional CCTV inspections that may be required by the City to verify that deficiencies have been corrected.

## **6-8 ACCEPTANCE OF SANITARY SEWER SYSTEMS**

The following steps must be completed before the City will accept the improvements and release the performance bond.

1. All easements must be reviewed, approved, and recorded, as per Section 1-9.3.
2. The sewer system must have been tested, inspected, approved, and accepted by the City construction inspector.
3. The City construction inspector must have received, reviewed, and approved the as-builts as per Section 1-14.
4. The City construction inspector must have received, reviewed, and approved the Sanitary Sewer Closed Circuit Television Inspection per Section 6-6.14
5. The City must receive a satisfactory maintenance bond per Section 1-5.2.

## **6-9 SANITARY SIDE SEWER**

Side sewers must be connected to the sewer main only, not into the manholes, unless otherwise approved by the Public Works Director.

### **6-9.1 DESCRIPTION**

The sanitary side sewer is that portion of a sewer line constructed between a public sewer line and the building from which the waste originates.

### **6-9.2 MATERIALS**

Materials must meet the requirements of Section 6-7.1.

All pipe must be clearly marked with type, class, and thickness, as applicable. Lettering must be legible and permanent under normal conditions of handling and storage.

Jointing must be with approved, flexible gasketing.

Flexible gasketing must include rubber, synthetic rubber-like, and plastic materials specially manufactured for the joint, pipe size, and use intended, and must be furnished by the manufacturer of the pipe to be used.

### **6-9.3 GENERAL**

Side sewer construction must conform to Standard Details 601, 602 and 607.

The Developer must obtain a side sewer permit and all other required permits before connection to the sanitary sewer main will be allowed.

Side sewer locations shown on the drawings must be subject to relocation in the field. Regardless of the location shown on the drawing, the Developer must place the tee branch in the sewer main at the location designated by the City construction inspector.

Four or more buildings must not be connected to a side sewer unless approved by the Public Works Director.

Side sewers must not cross a public right-of-way or run parallel to the right-of-way centerline.

### **6-9.4 SIDE SEWER CONSTRUCTION**

Excavation, bedding, backfill, and compaction for side sewers must conform to the requirements of the Bothell Standards, and to Standard Details 470 and 471.

Side sewers must have a minimum cover of 5 feet in the public right-of-way and 2 feet inside the property line, unless otherwise approved by the Public Works Director.

### **6-9.5 SIZING SIDE SEWERS**

That portion of a side sewer located within the public right-of-way must have a minimum diameter of 6 inches.

That portion of a side sewer located on private property must have a minimum diameter of 4 inches for single family residences, and 6 inches for all other uses, except for high-consumption uses, which are determined by the Public Works Director on a case-by-case basis.

#### **6-9.6 SLOPE OF SIDE SEWERS**

Side sewers must have a minimum slope of 2 percent, unless otherwise approved by the Public Works Director. A flapper, swing valve, or other approved device must be installed when, in the opinion of the Public Works Director, when the rim of the manhole is higher than the bottom of the lowest fixture in the structure or there exists a reasonable possibility of sanitary sewer backup from the sewer main into the residence or business.

#### **6-9.7 FITTINGS AND CLEANOUTS FOR SIDE SEWERS**

All fittings must be factory produced and must be designed for installation on the pipe to be used. Fittings must be of the same quality and material as the pipe used, except when installing a PVC insert on existing pipe.

Side sewers must be connected to the tee, wye, or riser provided in the sewer main, where such is available, utilizing approved fittings or adapters. Where no tee, wye, or riser is provided or available, connection must be made by core drilling and installing an approved tee. Tees must be Romac Industries, Style CG or approved equal.

All side sewers must have a six (6) inch cleanout at the property line as shown on Standard Detail 602. The riser portion of the cleanout must be PVC, unless otherwise approved by the City construction inspector. Cleanouts must be spaced no more than 100 feet apart.

#### **6-9.8 TRACER TAPE**

Tracer tape must be installed over non-metallic sewer mains and side sewer pipes and stubs. The tracer tape must be placed approximately 1-foot above the top of the pipe along its entire length.

Tracer tape must be 6 inches wide Lineguard Type II Detectable, or approved equal, and must be marked "sewer."

#### **6-9.9 TESTING OF SIDE SEWERS**

All side sewers must be tested after backfill. Side sewers that are reconstructed or repaired to a length of 10 feet or more must be tested for watertightness. Testing will not be required for newly reconstructed sections of side sewers consisting of a single length of pipe. Testing must be performed in the presence of the City construction inspector in accordance with Section 6-7.12.

When a new side sewer is installed, the entire length of new pipe must be tested. In cases where a new tap is made on the main, the first joint of pipe off the main must be installed with a test tee, so that an inflatable rubber ball can be inserted for sealing off the side sewer installation for testing. In cases where the side sewer stub is existing to the property line, the test ball may be inserted through the cleanout wye to test the new portion of the side sewer installation.

#### **6-9.10 SIDE SEWER AS-BUILTS**

The Developer must submit a side sewer as-built drawing to the construction inspector at the time of the side sewer inspection. The side sewer as-built drawing must show the following:

1. Property boundaries, with dimensions, north arrow, and abutting streets.
2. Location and size of existing buildings.
3. Location of the side sewer, its connection with the building, and the pipe material and diameter.
4. The depth and point of connection of the side sewer to the sanitary sewer main.
5. Any additional information the construction inspector deems pertinent.

## **6-10 SEPTIC TANKS**

Septic systems are generally not allowed within the City. If the Public Works Director determines that public sanitary sewer service is not available or that it is not practical , a septic tank system may be installed upon approval by the Public Works Director and issuance of a septic permit by the Snohomish Health District or King County Public Health, depending on the property location.



## 6-11 LIFT (PUMP) STATIONS

All side sewers must gravity flow into the City's sanitary sewer system. Bothell does not promote construction of individual side sewer pumps or public lift stations. The City will only consider these methods if a gravity system cannot be constructed. Private pressure side sewer lines are not permitted within the public right-of-way. If a gravity system cannot reasonably be constructed and a non-gravity system has been approved by the Public Works Director, the private pressure lines must enter a manhole on private property and gravity flow into the public system with a standard side sewer connection. The minimum manhole size permitted for this application is 30 inches in diameter. The manhole must be installed with a locking lid frame and cover as per Standard Detail 621.

Construction plans for lift stations must be reviewed and approved by the Public Works Director. The following items will be considered for each application:

1. Lift stations are to use submersible pumps.
2. Public lift stations must be set up with auxiliary power, including an automatic transfer switch.
3. Provisions for telemetry and/or alarms are be required.

## 6-12 GREASE TRAPS AND INTERCEPTORS

Whenever a commercial and/or retail food preparation operation, regardless of size, generates polar or non-polar fats, oils or grease (F.O.G.) waste, which causes a visible sheen or accumulations in the effluent, to be discharged to the sanitary sewer, pre-treatment is required in accordance with Bothell Municipal Code 18.03 and the Uniform Plumbing Code.

A grease interception device as specified by the City of Bothell Standard Detail 610, and/or other biological, chemical, or other pretreatment approved by the Utility, must be installed by the owner. Effluent discharged from any grease interceptor must not contain a visible sheen or accumulations of F.O.G., and must be in compliance with the City of Bothell and King County Wastewater regulations for discharge to the sanitary sewer.

- A. Design of the grease interceptor must conform to the Standard Details, and will be subject to approval by the authority having jurisdiction (AHJ) and Utility pre-treatment. Size must be determined by the UPC and manufacturers recommendations.
- B. Fixtures in the kitchen area which discharge waste-water containing grease are to be connected to the grease interceptor. Such fixtures include pot sinks, range woks, janitor's sink, floor sinks, and rotoclones. Dishwashers, Toilets, urinals, and wash basins must not flow through the interceptor.
- C. The interceptor must be located outside the building within twenty feet of drive for access by maintenance vehicles.
- D. The interceptor must be filled with clean water prior to start-up of system.
- E. Access to the interceptor must be maintained free for inspection and compliance determination sampling at all times.
- F. When pre-treatment is no longer required, the inlet and outlet pipes must be permanently plugged, the separation chambers pumped out, and the vault removed, or filled with compacted crushed rock or controlled density fill.

## 6-13 OIL/WATER SEPARATOR

Whenever an industrial or commercial business generates mineral /petroleum /non-biodegradable cutting oils exceeding 100 milligrams per liter to be discharged to the sanitary sewer, pre-treatment is required. An oil/water separation device must be installed by the property owner as specified on Standard Detail 611. Selection and sizing of an oil/water separator must be subject to approval of the Utility. Water discharged from any oil/water separator to the sanitary sewer system must not contain in excess of 100 milligrams per liter of petroleum oil, non-biodegradable cutting oil and mineral products, and must be in compliance with the City of Bothell and King County Wastewater regulations for discharge to the sanitary sewer.

- A. Sizing of a separator facility must be based upon maximum available flow to the separator and provision of a forty-five minute retention time in the separator at that flow, with a minimum capacity of at least 100 gallons.
- B. The oil/water separator must be covered with removable sections. Access and inspection covers, weighing not more than 30 lbs. and with suitable hand holds, are to be provided directly above inspection “tee” and oil/grit collection compartments.
- C. Only waste water from floor drains and covered parking areas must drain to the separator. The location and design must minimize or eliminate the possibility of stormwater reaching the separator -- areas over two hundred square feet open to rainfall must not drain to the separator. Sewage from restrooms and shower facilities must not drain to the separator.
- D. The separator must be located within 20 feet of drive for access by a maintenance vehicle.
- E. A sampling tee must be located on the outlet as shown on the Standard Details. Access to the separator must be maintained free for inspection and compliance determination sampling at all times.
- F. The effluent discharged from any oil/water separator to the sanitary sewer must not exceed 100 parts per million total oil.
- G. When pre-treatment is no longer required, the inlet and outlet pipes must be permanently plugged, the separation chambers pumped out, and the vault removed, or filled with compacted crushed rock or controlled density fill.

# Chapter 7

## Sections

### 7-1 General Requirements

## TRAFFIC CONTROL PLANS GUIDELINES



City of Bothell™

## DESIGN AND CONSTRUCTION

## STANDARDS AND SPECIFICATIONS 2019

## 7-1 GENERAL REQUIREMENTS

This Section provides designers with general Traffic Control Plan guidelines and examples of minimum desirable applications for typical situations requiring temporary lane closures and/or lane shifts. This information may be used along with the current Manual on Uniform Traffic Control Devices (MUTCD) Part VI to prepare more detailed and site specific Traffic Control Plans that will enable the Developer to construct the project with adequate consideration of safety to motorists, pedestrians, bicyclists, and construction workers.

Traffic control plans are to be submitted in association with a Right-of-Way Permit or other City of Bothell construction permit. Traffic Control Plans may be prepared in accordance with the current Sample Plans, however, Traffic Control Plan are intended to be developed with respect to site-specific constraints and construction procedures. Site-specific plans are required for projects that include signalized intersections, span multiple blocks or intersections, or as otherwise required by the City of Bothell. City of Bothell typical Traffic Control Plans, Details 701 through 712, may only be used for projects that do not exceed work area and roadway channelization depicted on the sample plans.

The Traffic Control methods established for each project should be consistent with the general provisions of this Section and should be based on good safety practices, engineering judgment, the speed and volume of traffic, the duration of the operation, the exposure to potential hazards, sight distance constraints and the physical features of the roadway including horizontal alignment, vertical alignment and the presence of intersections and driveways.

Traffic control plans that span multiple blocks or intersection must include construction phasing details and associated separate Traffic Control Plans. As a minimum, Traffic Control Plans should include the following items:

- Map depicting project location including street names and channelization, full limits of proposed traffic control, construction phasing if applicable, and construction area(s) including proposed construction activities and excavation depths along with existing and proposed utilities if applicable.
- Detours with respective detour signing for the complete detour route, if applicable
- Traffic Control Signing for each staging plan and required lane widths.
- Traffic signal impacts, temporary traffic signals, and associated signal phasing design if applicable. Uniform Police Officer control required for work that impacts traffic within and adjacent to signalized intersections.
- Traffic control and safety devices that are necessary for each stage of construction.
- Accommodation for Pedestrian and Bicycle traffic (i.e. locations of temporary sidewalks and bike lane revisions).
- Appropriate use of temporary / permanent barriers and end treatments.
- Appropriate plans and specifications to address safety concerns.
- Scale of map and north arrow.
- Allowable working hours (generally 9am to 3pm, Monday through Friday, unless otherwise approved based on project and traffic specific constraints).
- Note stating that a “Preconstruction meeting with the City of Bothell required at least 48 hours prior to start of work. Fire Department, Police Department, transit agencies, and School District notification required at least 48 hours prior to start of work”.

## **8-1 INTENTIONALLY LEFT VACANT**

# Chapter 9

## Sections

### 9-1 General Requirements

## FIRE PREVENTION & COMMUNITY RISK REDUCTION



City of Bothell™

## DESIGN AND CONSTRUCTION

## STANDARDS AND SPECIFICATIONS 2019

## 9-1 GENERAL REQUIREMENTS

This Section provides designers with general Fire Prevention & Community Risk Reduction guidelines for development and redevelopment within the City of Bothell. The City of Bothell Fire Department, as it relates to construction permits, reviews fire and life safety provisions for projects that fall under its jurisdiction.

The scope of construction work that requires Fire Department's development review includes access for Emergency Vehicles and Fire Apparatus, Addressing Standards, Fire Alarm Notification and Riser Room Door signage, and vehicle impact protection as depicted on Standard Details 901 through 910. Fire Department development review is completed in accordance with the current adopted version of the International Fire Code (IFC) and International Building Code (IBC) unless otherwise amended or revised in accordance with Standard Details 901 through 910. Fire hydrant location, spacing, and access requirements presented in Chapter 5, Water Distribution, are reviewed by the Fire Department in coordination with the City of Bothell Public Works Department.

Separate Fire Department review is completed for new and remodeled buildings as part of Building Permit Review. This review is independent of these construction standards and includes, but is not limited to: fire suppression and alarms; fire-rated construction; smoke control systems; exiting; high-rise construction; storage or use of hazardous materials; and public assembly occupant loads.